Paper title

The benefits of implementing Enterprise Risk Management: evidence from the non-life insurance industry

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Abstract

This paper addresses two critical questions on the performance of Enterprise Risk Management (ERM) i.e., whether its implementation adds value to the firm and whether it takes stages to mature. It confirms both arguments that ERM creates value when the infrastructure is fully embedded into a company’s operations and matured. The traditional methods of measuring value creation in non-life insurance; the combined and operation ratios failed to capture the benefits of ERM in a consistent way. The more scientific measure, return on capital and surplus which take a portfolio view on performance better captured the benefits of ERM than the traditional method. The results confirm the need to treat the implementation of risk management in a holistic manner if true benefits are to be realised. Therefore, the quality of value creation depends on the level of integration of risk into operations, underwriting, investment, human resources, reporting, compliance and IT functions. Insurance companies will be better off implementing ERM than adopting a silo type risk management initiative.
Introduction

Business exists to secure opportunity out of taking risk. No business is profitable without controlled risk taking and managing them effectively. Consequently, the management of risk is a core function for all types of business. Risk management literature has attempted to distinguish between different methods adopted by companies in managing their business risk and evaluating their effectiveness. Two main schools of thoughts have emerged from the literature; the silo approach which focuses to manage risk in isolation (e.g., market risk, credit risk, etc.) and the alternative approach to manage all risks in a single and holistic framework. The latter is termed as ERM (Nacco, 2006).

In economic perspective value maximization for the entire firm is an overarching corporate goal. In addition, this is also the broader purpose of an integrated (or enterprise) risk management (Meulbroek, 2002b). Although previous research predicts that management of risk in a holistic framework brings opportunities, it still remains untested with empirical evidence. For example, the potential benefits of risk management were argued by several researchers. Some of these theoretical arguments emphasised that financial risk management provides lower taxes, higher debt capacity, and prevents the cost of financial distress to the firms thus allowing comparative advantage (see Froot, 1993; Stulz, 1996, Doherty, 1993). Since firms’ earnings (i.e., cash flow) volatility is negatively related to the value the firm, the management of financial risks (foreign exchange and interest rate risks, in particular) using derivatives reduces the cash flow volatility and add value to the firm (Smithson, 2005). In addition, others e.g. Gates (2006); Meulbroek (2002b) emphasised on better diagnosis and control of strategic and operating risks, better-informed decisions, greater management consensus, increased management accountability, smoother governance practices, ability to meet strategic goals, better communication to the Board, reduced earnings volatility, increased profitability, securing competitive advantage and accurate risk adjusted pricing. The study of Minton (1999) suggested that in the rise of cash flow volatility the firms tend to reduce the capital expenditure, R&D expenditure, and advertising expenditure. It can be argued that since risk management reduces the cash flow volatility, this, in effect, assists the firm to invest in these three activities. As a result, the firm acquire competitive advantage in the market. From a practitioner perspective Leautier (2007) suggested that risk management enables firms to secure financial flexibility that

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1 Culp (2002) provided an overview of the literature on value maximisation through corporate risk management.
supports growth at a minimum cost during adverse business conditions, making better business decisions, leveraging the operational flexibility (e.g., pricing and arbitraging) and strategic flexibility (e.g., acquisition and divestment). In analysing the shareholder value creation ability of ERM at both macro and micro levels, Nacco (2006) suggested that the firms, which are in the business of taking strategic and business risks, can secure greater competitive advantage by practicing ERM. In addition, such firms can exhibit superior decision-making capability at several management levels taking advantage of risk and return trade-offs. However, these studies were criticised as they overlooked the irrational behaviour of the market and changes in organisational variables, which have a significant role in the success or failure of firm's risk management practice.

Previous research focused on ERM topics, e.g., structure and implementation of ERM in insurance (Acharyya, 2006; Altuntas, 2011); firms' characteristics in adopting ERM (Kleffner, 2003; Beasley, 2005; Beasley, 2008; Liebenberg, 2003, Pagach, 2011). However, a few models exist in the literature that measures the effectiveness in terms of value or benefits of ERM. Recently, Hyot (2011) studied the benefits of ERM in insurance. Using data of 117 U.S. listed life and property-causality insurance companies from 1998 to 2005 they found positive relationship between implementation and firm value. This study aim is to test whether ERM adds value to the bottom line issues (i.e., survival) of an insurance company. However, we believe that the asset-liability structure of life insurance companies is different from non-life companies. Consequently, the ERM structure of life companies should be different for these two types of insurers. Consequently, we need a difference set of data specific to the type of insurance (i.e., life and non-life) to evaluate the added value by ERM. We developed a simple mathematical model to measure the effectiveness of ERM and apply this in the insurance industry. We argue that risk management is not a profit-making function thus the value of risk management is not immediately evident. Our results however confirm that ERM practicing insurers' deliver consistent results in adverse market conditions.

The article is structured as follows. First we review the literature of the history of risk, the evolution and practice of ERM and value creation in the insurance business. Thereafter, we describe the data and methodology that are used in analysing the impact of ERM on insurance

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2 It is important to note that the use of risk management terminology in finance literature. In most cases, the literature/authors talked about the market risk (foreign exchange and interest rate risks) and risk management by derivatives only. However, ERM is about all significant risks (much beyond financial risks) and pursue for a holistic framework. The management of foreign exchange and interest rate risk is now much common and standard and risk from these two sources is unlikely to cause failure of any organisation.
business. The actual analysis of data and findings are subsequently presented. Finally, we provide a summary and conclusion of this study.

Literature review

In the literature review we first described a history of risk management and the evolution of ERM. We distinguish the enterprise risk management from generic risk management in terms of design and effectiveness in creating value for the organisation. We argue that the generic risk management, which focuses to eliminate downside risk, is not enough to create value for the entire firm. The finance literature suggests that in order to secure opportunity organisations should focus on the upside risk management and simultaneously should target to reduce the variability of the earning indicators (e.g., cash flow). Thereafter, we move our focus to the risk management practice in the insurance industry. We analysed the economics of insurance and the value adding divers in the insurance business. We then analysed the literature to reveal how ERM was adopted in insurance. The output of this analysis was then utilised to develop a model to determine the value of ERM in the insurance industry.

Risk is an inherent element for both operational and strategic decision making in all business and policy matters. Historically, in many corporations, risk management was limited to insurance purchase in order to protect the business from accidental damage from specific undesirable events e.g., natural catastrophes, fire, fraud, etc. (Meulbroek, 2002b, Nacco, 2006). In addition, the use of risk management as a tool of hazard mitigation in some areas e.g., health and safety, business continuity and crisis management is well known in business. It was in early 50’s when Harry Markowitz’s (1952) work on mean variance portfolio selection model gave birth of financial risk management. This innovation was then followed to the development of Capital Asset Pricing Model by Sharpe (1964), Lintner (1965) and Mosson (1966) to compute risk associated with the return on investment in the security market. Thereafter, Black-Scholes rational option pricing model provided a new set of risk management literature under the discipline of financial economics. In line with the sophistication of risk management tools and techniques several capital market products (e.g., credit derivatives) were developed. Consequently, the traditional insurance mechanism was substituted by financial risk management techniques e.g., hedging and securitisation (Miller 1992, Rawls & Smithson, 1989). The primary goal of financial risk management as Stulz (1996) suggested “is to eliminate the probability of costly lower-tail outcomes – those that would cause financial distress or make a company unable to carry out its investment strategy.” This means that firm’s practice of financial risk management aims to eliminate downside risk and reduce the expected cost of financial distress. Stulz (1996) argued that the firm’s survival during financial/economic crisis can also help the firm to carry out business in future with optimal capital and ownership structure.

3 By downside risk we mean the type of risk that has potential of damage and loss without any component of opportunity.

4 References are not including in the Bibliography as they are very well known papers in the area of finance and economics and can be obtained by Google search.
The pricing of risk associated with these structured financial products and transferring of risk from one party to another without holding any ownership for a longer period of time were the key focus of such risk management activities. This development was in contrast with the insurance risk management technique. Insurers underwrite risks and manage them through pooling with other risk carriers, where the thrust of getting the ownership of risk either fully or partially was the ultimate intention of insurance companies. The management of risk was also considered in the management discipline. The key focus is the behavioural issues associated with managerial risk taking and firm-wide strategic decision making process as advocated by several authors e.g., Miller (1998), Bromiley, (1991) and others.

In a nutshell, the literature suggests that risk was traditionally managed in silos. In the banking sector, for example, there exists piecemeal approach focusing on market, credit, liquidity, and operational risk management. In the insurance sector, risk arising from underwriting, investment and treasury functions are managed in silos. However, it does not mean that there was no intention amongst the businesses to manage risk in holistic and integrated framework. Actually, there were several attempts to this effort. In the academic field the texts of business risk management as advocated by several authors Mehr (1974), Dickinson (2001) and Meulbroek (2002a) eventually talked about holistic type of risk management. In practice, the insurance companies developed multiline and multiyear products as a part of their integrated risk management programme for large clients. Following the development of derivative products in the capital market some global reinsurers, e.g., Swiss Re, Munich Re, etc. developed a new technique i.e., Alternative Risk Transfer (ART) to finance some of their high-severity and low frequency risks (e.g., natural catastrophes) in a sort of non-traditional way through insurance linked security products (Culp, 2002). Meanwhile, some large corporate scandals e.g., Barings Bank, WorldCom, Enron, etc., in mid-80’s and early 90’s and even banking failures in 2008 financial crisis demonstrated that (i) organisational failures happen due to lack of managing risk and (ii) holistic risk management is a cost effective function. Consequently, after 1990s, there appeared an increased volume of risk management literature focusing on the holistic risk management under the title of ERM in business practice, academic studies, and public policy matters. A close study of the literature suggests that the term ERM was actually innovated in practice by some consulting firms e.g., Tillinghast Towers Perrin, professional bodies e.g., Society of Actuaries, prudential standards e.g., AS/NZS 4360:1995, Committee of Sponsoring Organisations (COSO) etc. In addition, the mergers and acquisitions within, cross industry, and cross-broader as a result of several economic factors, e.g., globalisation, e-commerce and regulatory liberalisation, the risk of businesses became even more large and complex. Consequently, organisations gradually moved from traditional silo to a holistic perspective in integrating their risk management tools and techniques at the corporate level. There are at least four basic characteristics of ERM over the traditional way of managing risk, as Culp (2002) identified, are (i) efforts on consolidating financial and non-financial risk while separating core risks of the business from their non-core risks; (ii) managing all risks facing by a company through a coherent and common framework (e.g., VaR technique of risk measurement); (iii) consolidating the risk management process across the enterprise-wide

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5 A multi-disciplinary task force of Standards Australia/Standards New Zealand first published this risk management standard in 1995 and subsequent revisions were produced thereafter.
Having identified the generic characteristics of ERM the study will now focus to accommodate the fundamental economics of insurance business on the ERM programme.

Insurance economics

In insurance, risk management is even more embedded in all business decision making. Ideally, the value of an insurance business is created from three core functions i.e. underwriting (including reinsurance), investment, and finance (including treasury) as argued by Correnti (1997). This includes the interest of both policyholders and shareholders. Theoretically, insurers’ ERM should consider all these three areas of business. However, in practice, insurers ERM is aligned with the shareholders’ value maximization model. This practice is in line with the theory of rational behaviour. The efficient market hypothesis, which is an application of this theory, assumes that the current stock market performance of a firm reflects the present value of the discounted cash flows of any investment in this firm. This indication serves the investors in deciding alternative investment choices. From a risk management point of view this incomplete hypothesis underestimates the expectation and involvement of other stakeholders in operating the business of a firm beyond the capital market. In addition, the ownership structure of an insurance business is different from other financial intermediaries. In fact, policyholders supply working capital to the firm while paying premiums upfront. Consequently, insurers’ ERM must not ignore the interest of the policyholders and other key stakeholders in addition to shareholders. These issues are introduced further while discussing the value creation activities of risk management in this paper. The following paragraphs describe in detail the unique nature of insurance business from the point of view of risk management.

On the investment side, insurers who invest most significantly in the equity and property markets may face considerable loss because of a sudden drop in equity prices or a downturn in property values. This may result in a mismatch of asset and liability values (asset < liability). Also, the selection of the investment (i.e. assets) portfolio (which is an issue of risk appetite) provides a major source of risk for insurers. Moreover life insurers who issue policies with guarantees suffer significant losses when interest rates fall below the minimum technical level. In addition, insurers with global business are exposed to foreign exchange risk due to the mismatching of currencies when receiving premiums and settling overseas claims. Furthermore, mismatch between the insurers’ statutory financial year with the underwriting year is a distinct issue in insurance business.

The ownership structure of insurance companies is also distinct from others within the financial industry. Mutual insurers are ultimately owned by policyholder6. Propriety and casualty

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6 This article does not include mutual companies although they represent the insurance market extensively.
insurers are principally owned by shareholders and value maximization of the stockholders is their ultimate objective. In contrast, life insurers build up bonus reserves which are ultimately paid out to policyholders. However, some of parts of these bonus reserves also count as solvency capital, hence are at risk if a company is in financial distress. The conflict between stockholders and policyholders is a unique phenomenon in the insurance business. There is a debate, in particular in the UK, as regards to orphan estates, which were built up to meet policyholder obligations, and where shareholders claim a stake in them. In essence, shareholders prefer higher dividends thus leaving the least possible capital in the balance sheet, whereas policyholders do appreciate the capital strengthening initiatives of their insurers as they can draw the money when needed (Merton, 1993). Hence, the ultimate message of the above discussion is that the conflicting interests between stockholders and policyholders obliged insurers to create value for both stakeholders. The following paragraphs concentrate on the value creation literature in insurance.

**Value creation in insurance**

Insurance is a leverage business. Typically, insurers borrow money from policyholders (i.e. charging premiums upfront, which is a type of ‘debt’) and stockholders (i.e. risk capital). As discussed earlier there are three sources for value creation activities in the insurance business. They are underwriting, investment and finance with treasury. Insurers’ underwrite risks to make profits. The underwritten risks are diversified through reinsurance and pooling and the remaining capital is then invested in the capital market to generate return. However, there are costs associated with borrowing capital (i.e. cost of capital). The fundamental concept of value creation is that the cost of capital must be less than the return earned from the investment. In insurers’ economic balance-sheets, both the assets and the liabilities represent the market (i.e. economic) value and no secondary market exists for liabilities (i.e. insurance policies). Practically, the cash flows of insurance liabilities are derived from the best estimates by taking the time value of money into account (see Hancock, 2001a; Babbel, 2005). This indicates that insurers’ liabilities are exposed to both insurance and investment risks. Hancock (2001b) also pointed that insurers, in essence, use replicating cash flow techniques to separate these two risks from each other. Ideally, the value of insurers from investment suffers from double taxation (both on return and dividend). However, insurers create value by borrowing money from the comparatively inefficient insurance market over the capital market by taking the advantage of underwriting cycle. This contradicts the financial economics view of value creation. Allocation of capital is also a distinct feature of insurers’ financial activities. In order to measure the true profitability, insurers state capital on an economic basis. Theoretically, economic capital (a part of the shareholder value, with the remaining part being franchise value i.e. the future earnings
expectation) is the surplus in market value of insurers’ balance-sheet (market value of assets less the market value of liabilities). This capital, as Kulik (1999) suggested, realistically represents the amount of capital and is actually available to invest in the business. Additionally, the risk quantification approach of finance divides firms’ total risk into two components: systematic risk and unsystematic risk. Although this approach can quantify insurers’ investment risk with conditions, the same is not applicable to quantify insurers’ enterprise risk, which essentially includes underwriting and operational elements.

The literature review provides us the following three key arguments that will be utilised in analysing of data. First, we assume that the volatility of earnings (i.e., cash flows) is leading indicator of risk and this disproportionately moves with the value of the firm. The risk management efforts of firms reduce the volatility (i.e., risk) of the cash flow. We also argue that the earning volatility increases during the period of financial distress and economic crisis. Since risk management is a proactive approach, the earning volatility of the ERM practicing firms should decrease over the longer time-horizon. Second, the survival of the firm during the crisis events is the ultimate test of a successful ERM programme. However, unlike financial risk management, ERM should not focus only on the extreme events. Rather, it should focus on the steady growth of the firm that will ultimately offset the impact of the extreme events over the longer time-horizon. Third, since ERM is to maximise the entire value of the firm, the ERM performance measurement model should include the interest of the policyholders’ in addition to stockholders’.

In a nutshell, the above discussion on measuring the value creation in insurance by ERM, confirms a unified model that represents the interest of both policyholders and shareholders. The model should include insurers’ value, driven by the performance of underwriting, investment and finance including treasury activities.

**MODEL, DATA AND METHODOLOGY**

In this section, we specify the variables and the data that will enable us to do an empirical analysis on the impact of ERM on Insurance company cash flows. With the three key arguments as drawn in the end of literature review will develop hypothesis and test with the empirical data. Our analysis is based on company data rather than market figures. This is
because the company specific data can help us to capture effectively the impact of implementing ERM on key value drivers. Such an internal measure will also help us to identify how the implementation of an integrated risk management over the periods of study, would reduce variability under each value driver. The question that we specifically seek to answer is whether risk management that is implemented in an integrated way, has more significant impact on insurance cash flow volatility (Meulbroek, 2002b), than the risk management implemented using a silo approach. This cannot be achieved when we use market data, as every effect is bundled into a single variable, e.g., the share price. Furthermore, a majority of insurance companies are not publicly traded, so in order to have a large sample we chose to use company specific data. This will enable us to achieve the purpose of this analysis, i.e. inferring on the effectiveness of ERM in reducing the cash flow volatility of insurance companies’ key value drivers. The three key value drivers in insurance companies chosen for analysis were, return on capital and surplus (ROCS), combined ratio (CR) and operational ratio (OR). We computed ROCS by dividing operating income with the two year average of capital and policyholder surplus as seen in the following model.

$$\text{ROCS}_t = \frac{\text{OI}_t}{\text{CPHS}_{t-1} + \text{CPHS}_t}$$  \[1\]

In this model, \(\text{ROCS}_t\) is the return on capital and surplus in year \(t\); \(\text{OI}_t\) is the operating income in year \(t\); and \(\text{CPHS}_t\) is the capital and policyholders’ surplus in year \(t\). It measures how effective a company is utilising contributed capital at time \(t\). The model is used to measure an insurance company’s operational profitability, before capital gains and losses and before income tax. It captures how much the company is returning on capital employed as used by analysts to measure insurance company performance. So managers would focus and aim to control behaviour of this model as it has a bearing on the valuation of the company. Therefore, this model would be ideal for measuring the effectiveness of implementing ERM. The statistical advantage of using this model is that it is based on the recurring internal earnings without transitory items, a true reflection of long term operational performance. It captures the impact of items like the level and mix of business writings, its geographical orientation and regulatory environment, investment philosophy and financial market environment, these are all primary targets of an effective ERM programme. It also captures other factors such as growth, taxes, expenses, persistence of reinsurance coverage, and premium and loss reserve adequacy. In essence, these factors define an insurance company’s underlying capital management structure and are the key to its survival and solvency. In insurance, operational profitability is the single most important source of surplus growth, which is an important element in providing protection.
against shocks from unexpected loss events. Moreover, ROCS does not only focus on return on shareholders’ contributed funds, but also on policyholder protection. It means that maintaining a low volatility of ROCS through ERM will benefit all stakeholders. Therefore, this model [1] is considered as the best proxy for measuring the impact of ERM, as it is a result of residual cash flows from operations, divided by the capital required to support the operations.

In order to observe the impact of ERM we derive the following two hypotheses.

1. If ERM is effective in a company then it should reduce cash flow volatility consistently until an equilibrium point is reached. We define the equilibrium where the marginal benefit equals to the marginal cost of building the risk management infrastructure.

2. We assume that as long as the equilibrium in risk reduction is not reached, reductions in volatility should be consistently observed over the period of analysis.

We first aim to test of the hypothesis using the model [1] where we seek to establish the relationship between consistent quality return on capital and surplus, and ERM.

In our understanding the other measures of insurance company performance like the CR and OR are more crude, as they do not take into account risk capital supporting the generation of these cash flows. While the combined ratio is a product of incurred losses and expenses divided by earned premiums, the operational ratio deducts investment income from the numerator. The ratios used in our analysis were extracted from A.M. Best property/casualty insurance business database for the years 2000 to 2009 (A.M. Best, 2009). The period chosen enabled us to capture the trend on the impact of ERM from its early implementation to date. Most insurance companies started to implement ERM after 9/11 in 2001 and it was also during this period that companies started reporting ROCS as a measure of operational profitability, which makes it the most appropriate period for our analysis. The criteria set for the selection of a company in our data set, is based on the companies having been trading as an authorised insurer in the United States and having all data captured for the entire period on the A.M. Best database. An analysis of US insurance companies as compared to their European counterparts provided us with a much larger sample size, since more than 165 insurance companies in the US have already publicly declared that they have been implementing an integrated risk management in the past 5 years, as compared to less than 20 in Europe (A.M. Best 2009). If a company does not have complete data under a specific category it is eliminated.
In order to measure the impact of ERM on company performance, we have chosen to use portfolio standard deviation as a measure of risk, which we believe a proxy to measure insurance companies’ cash flow volatility. In essence, standard deviation is a measure of variability of outcomes from the expected cash flows and it captures the level of risk in the cash flows. Since reducing variability in cash flows of a firm is the main aim of ERM, lower standard deviations (or volatility) could be construed as one indication of an effective ERM programme. Other measures e.g. Value at Risk (VaR) or Expected Shortfall (ES) although considered better measures than standard deviation, could not be used in this study since their computation requires the use of more granular data. In addition, these measures are appropriate for tail risks only. Since this data is hard to come by, this precludes these methods from our analysis. Furthermore, even if we extract company calculated VaR figures, the fact that different models and confidence levels are used makes it difficult to have uniform data. In contrast, computing key value drivers’ standard deviation from the raw data enables us to compare companies easily. The ratios of key value drivers i.e., ROCS, CR, and OR extracted from A.M. Best database are used to calculate standard deviation, over five year window periods. For example standard deviation for each of these three key drivers was computed over six intervals, i.e. 2000 to 2004; 2001 to 2005; 2002 to 2006; 2003 to 2007; 2004 to 2008 and 2005 to 2009. These five year window periods help us to calculate standard deviation/volatility for each company over the window. Therefore, these five-year windows enable us to measure volatility trends over the period 2000 to 2009. We measure the trends by calculating the percentage changes between these five-year periods progressively. The mean, minimum and maximum changes in volatility are then computed, together with the count of companies exhibiting either negative or positive changes in volatility. These results are presented in the exhibits 1, 2 and 3. This is a simple and robust methodology and is the first one to be used to measure effectiveness of ERM on insurance company performance.

ANALYSIS AND RESULTS

In this section we test the implication of building and implementing ERM infrastructures in non-life insurance companies. The focus is on how ERM affect the key value drivers in a non-life insurer. In this case, the stability or resilience of the value drivers to movements in risk factors is used as a proxy to explain the benefits of implementing an effective ERM structure.
The intuition is that an effective ERM infrastructure help stabilise the long term bottom line of an insurance company’s operations. The level of resilience assimilated determines the capability of an infrastructure to handle risk. This capability is build overtime and matures as the infrastructure becomes embedded into day to day operations. Our results show that while resilience increases, it does so at a decreasing rate as maturity is reached. In other words there is an inflection point that is reached when ERM is taken through its paces, unless it’s used as a tool of competitive advantage. This inflection point is reached the marginal benefits are equal to the marginal costs of maturing an ERM infrastructure programme.

The point of equilibrium in the insurance industry is not yet attained as a survey done by KPMG (2010) showed that many companies had not fully implemented ERM. Therefore, volatility in the key drivers might still fall over ensuing periods. This should be conspicuous and consistent over all the key value drivers for companies that have successfully adopted ERM.

We also expect the strength of reduction in volatility to be significant on ROCS, as this is the main scientific value driver used by insurance companies to measure their performance (A.M. Best, 2009). Other two measures i.e., CR and OR, are not scientific measure, but should give us a good indication on the direction and extent to which volatility in underlying portfolios is changing over the analysis period, in the face of ERM.

Results of the analysis are reported below in Exhibits 1, 2 and 3. The results reported are for the test of the relationship between ERM and changes in volatility of the key value drivers in a non-life insurance company return on capital and surplus (ROCS), Combined Ratio (CR) and Operating Ratio (OR), respectively. The empirical testing of impact of developing an ERM infrastructure is done by comparing the change in volatility between two-five year volatility windows over a period of ten years. A company is adjudged to have successfully augmented the ERM infrastructure in its operations if there is evidence of reduction in standard deviation for the value drivers analysed in this study. The results in Exhibits 1, 2 and 3 support the hypothesis that ERM reduces firms’ risk when implemented efficiently and that it becomes more efficient as it goes through its maturity phases.
## Exhibit 1: Changes in Volatility of Return on Capital & Surplus (ROCS)

<table>
<thead>
<tr>
<th>Window Period</th>
<th>Changes in Volatility</th>
<th>Increase of Volatility (+Δ)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reduction of Volatility (-Δ)</td>
<td></td>
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<tr>
<td></td>
<td>N</td>
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<tr>
<td>2000-04/2001-05</td>
<td>784</td>
<td>402</td>
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<tr>
<td>2001-05/2002-06</td>
<td>784</td>
<td>499</td>
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<tr>
<td>2002-06/2003-07</td>
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<td>485</td>
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<tr>
<td>2003-07/2004-08</td>
<td>784</td>
<td>302</td>
</tr>
<tr>
<td>2004-08/2005-09</td>
<td>784</td>
<td>366</td>
</tr>
</tbody>
</table>
In Exhibit 1, the results reported show two sides to the story. On one side the story is that of companies experiencing reduction in volatility, whilst on the other that of companies exhibiting increases in volatility. The period 2000 to 2008 saw the average risk in non-life insurance companies reducing by 4.21% at the beginning of the adoption stage and peaking at 6.41% for the period 2003 to 2008. This is also evident in the range of the level of reduction experienced during the same period 2000-2008, from –0.01% to -243.13%. The results show that companies that adopted ERM managed to reduce their risk irrespective of the occurrence of the most devastating catastrophic losses in 2005 and the global economic crisis. The number of companies reducing their risk levels during the financial crisis period increased from by 64 from 302. This period also saw the largest reduction of risk of 243.13%. The resilience of ERM programs implemented during the period of study attest to the benefits of implementing embedded ERM infrastructures.

The other side of the story tell a tale of higher volatility range and standard deviation for those companies that failed to embed ERM in their day to day operations. A study by Smithson and Simkins (2005) show that risk management reduce the sensitivity of cash flows to risk factors. These companies show higher than average risk during the period 2001-2006 and 2003-2008. These were periods when the insurance markets were affected by catastrophic losses and the global financial crisis. Average volatility was 0.50% and 18.50% higher during these periods. This is also matched by standard deviation of 9.01 and 42.58% respectively. The higher than expected volatility and a wider volatility range is evident of companies less resilient to movements in risk factors. It can be construed that these are companies that failed to fully embedded ERM in their operations. This meant that they experienced higher levels of risk and were more vulnerable to catastrophic losses than their counterparts. The benefits of ERM are there to be seen in the way portfolios for those companies that have been reducing risk by better managing their risks were more resilient to extreme movements in risk factors. Companies in this category experience even experience greater reduction in risk over these periods than their counterparts that show heightened risk.
**Exhibit 2: Changes in Volatility on Combined Ratio (CR)**

<table>
<thead>
<tr>
<th>Window Period</th>
<th>Changes in Volatility</th>
<th>Increase of Volatility (+Δ)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reduction of Volatility (-Δ)</td>
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<td></td>
<td>N</td>
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<tr>
<td>Changes in Volatility on Combined Ratio (CR)</td>
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<tr>
<td>2000-04/2001-05</td>
<td>784</td>
<td>434</td>
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<td>2001-05/2002-06</td>
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<td>2002-06/2003-07</td>
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<td>2003-07/2004-08</td>
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<tr>
<td>2004-08/2005-09</td>
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<td>274</td>
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</tbody>
</table>

**Exhibit 3: Changes in Volatility on Operating Ratio (OR)**

<table>
<thead>
<tr>
<th>Window Period</th>
<th>Changes in Volatility</th>
<th>Increase of Volatility (+Δ)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Reduction of Volatility (-Δ)</td>
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<tr>
<td>Changes in Volatility on Operating Ratio (OR)</td>
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Observations in Exhibit 1 above are quite different from results in Exhibits 2 and 3. These measures are crude and are not scientific in nature. They show an inconsistent picture on reductions and increases in volatility during the study period. This is due to the fact that these value drivers do not capture the full effect of ERM from a portfolio viewpoint. In the true spirit of ERM, the value measures do only capture a part of the whole story. They consider one part of the Silo, excluding the other parts that form the vital foundation of ERM. This shortcoming makes them very difficult to use when determining the value of a variable like ERM, which is bottom line centric. The failure by these variables (CR and OR) during the study period to capture both the reduction and increase in volatility in a consistent manner confirms their handicap in capturing the holistic nature of the benefits of ERM.

The results show that whilst volatility in the three key value drivers is falling, it only does so in a consistent manner under ROCS. While the other two variables contribute to the reduction in risk, ROCS better explains the relationship between value creation and ERM. Their contribution to the bottom line emanates from an operational viewpoint, which is only one component of strategy setting under the COSO framework and the balanced scorecard system. The diversification benefits brought about to the whole portfolio are not adequately captured under these two crude variables. ROCS capture every element of how the organisation operates from the consumer, human capital, operational and financial perspectives as envisaged under the balanced scorecard system. These first three elements of the balanced scorecard system feed into the financial perspective which is captured by ROCS. The financial perspective shows how the company is perceived by the stakeholders – both policyholders and shareholders. The view of policyholders is dual in that they also occupy the customer perspective. A highly skilled staff will lead to a satisfied customer base which will indirectly impact the financial perspective. ERM has the ability to cut across these perspectives and deliver consistent value.

It is also interesting to observe that the number of companies showing reduction in volatility increased during the period and those exhibiting increased volatility (+Δ) also trended towards a higher volatility during the same period. Exhibit 1 shows that the average changes in volatility for those companies that we construe are yet to adopt ERM have increased from 3.01% to 21.77% during the period of study 2000 to 2009. One plausible explanation might be that those companies that haven’t fully implemented ERM tend to experience huge swings in volatility when faced with catastrophic losses in 2005 and the financial crisis in 2008/9. In fact during this period of analysis 2000 to 2007 the US Property/Casualty insurance market...
experienced the worst disasters in history, starting with 9/11 in 2001, a fall in stock markets in 2001-2002 due to dot.com bubble, hurricane Charley, Ivan, Frances and Jeanne in 2004, hurricane Katrina, Rita and Wilma in 2005, and culminating with the financial crisis in 2007-09. According to Towers Perrin (2005) of the insured losses from Katrina, 47% to 53% were borne by the insurers and 52% to 44% by reinsurers, which amounted to $18.8bn to $28.9bn and $20.7bn to $24.0bn respectively.

**Figure 1: Reduction of volatility of three value drivers in terms of number of insurance companies**

![Reduction of Volatility (-Δ)](image)

The Figure 1 illustrates the comparison of the reduction of volatility of the number if insurance companies in each five-year time window for all value drivers. This shows that the number of companies increases in the reduction of volatility after 2008 for only ROCS. We take this trend as a true reflection of market phenomena as a majority of insurers were adversely affected by 2008 financial crisis. However, this fact was not properly recognised by other two value drivers. This validates our assumption to consider ROCS as a true measure of insurers ERM initiative.

This report also shows that most of the reinsurers affected by this hurricane maintained their credit ratings. Therefore as per results in Exhibits 1 to 3 we can conclude that that those companies that have successfully adopted ERM early, have consistently delivered reductions in volatility across all the value drivers irrespective of the market conditions during this period. Those companies that are yet to fully adopt ERM have shown a trending towards higher
magnitudes of cash flow volatility across all the drivers, over the same period of analysis than those that have adopted ERM.

Consequently, in line with our argument above our conclusion is that silo risk management is futile, in that it fails to effectively mitigate long term cash flow volatility in non-life insurance companies. This result confirms that companies failing to adopt ERM in its entirety, face worst results than those that adopt ERM, both under normal business conditions or when faced with value depleting catastrophic events.

SECTION V: CONCLUSION

The objective of our study was to test if ERM adds value to insurers. Using a substantial number of US p/c insurance company data we found that insurers that adopted ERM have managed to consistently lower volatility in their key value driver i.e., ROCS. This is a result of the benefits of being able to measure risk in their portfolios, decide on hedging techniques, determine adequate levels of capital and adjust their strategies in the face of new information. This enables the ERM practicing insurers to track volatility in their portfolios and find ways of minimising it, hence their ability to deliver consistently stable portfolios in the face of adverse market conditions. This study shows that ERM has had a significant impact on insurance companies that effectively adopted it. We can confidently conclude that the adoption of ERM by insurance companies has enabled them to reduce risk and add value to both shareholders and policyholders.

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