

The Benefits of Implementing Enterprise Risk Management:  
Evidence from the U.S. Non-Life Insurance Industry

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# **The Benefits of Implementing Enterprise Risk Management: Evidence from the U.S. Non-Life Insurance Industry**

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## **Abstract**

This paper addresses two critical questions related to the performance of Enterprise Risk Management (ERM): whether its implementation adds value to the firm and whether it undergoes stages in order to mature. It confirms both arguments: that ERM creates value when the infrastructure is fully embedded within a company's operations, and it matures. When using the traditional methods for measuring value creation in non-life insurance, the combined and operation ratios fail to capture the benefits of ERM in a consistent manner. The more scientific measure, return on capital and surplus, which takes a portfolio view of performance, better captures the benefits of ERM than the traditional one. The results confirm the need to treat the implementation of risk management in a holistic manner if the true benefits are to be realized. Therefore, the quality of value creation depends on the level of integration of risk into the operations, underwriting, investment, human resources, reporting, compliance, and IT functions. Insurance companies are better off implementing ERM than adopting a silo-type risk management initiative.

## **1. Introduction**

Business exists to secure opportunities based on taking risks. No business is profitable without controlled risk taking and its effective management. Consequently, risk management is a core function for all types of business. The risk management literature has attempted to distinguish between the different methods adopted by companies for managing their business risk and evaluating how effectively they do it. Two main schools of thoughts have emerged from the literature: the silo approach, which focuses on managing risk in isolation (e.g.,

market risk, credit risk), and the alternative approach to managing all risks within a single, holistic framework. The latter is termed Enterprise Risk Management (ERM) (Nocco and Stulz 2006).

In the economic perspective, the value maximization of the entire firm is an overarching corporate goal. In addition, this is also the broader purpose of integrated (or enterprise) risk management (Meulbroek 2002b). Although previous research predicted that the management of risk within a holistic framework brings opportunities, it still remained untested with empirical evidence. For example, the potential benefits of risk management have been argued by several researchers. Some of these theoretical arguments emphasized that financial risk management provides lower taxes and a higher debt capacity, while also preventing the cost of financial distress to the firms, thus creating a comparative advantage (see Froot et al. 1993; Stulz 1996; Doherty and Smith 1993).<sup>1</sup> Since firms' earnings (i.e., cash flow) volatility are negatively related to the firms' value, the management of financial risks (foreign exchange and interest rate risks, in particular) using derivatives reduces the cash flow volatility and adds value to the firm (Smithson and Simkins 2005). In addition, others (e.g., Gates 2006; Meulbroek 2002b) have emphasized better diagnosis and control of the strategic and operating risks, better informed decisions, greater management consensus, increased management accountability, smoother governance practices, the ability to meet strategic goals, better communication with the board, reduced earnings volatility, increased profitability, securing a competitive advantage, and accurate risk-adjusted pricing. Minton and Schrand (1999) suggested that, as cash flow volatility rises, firms tend to reduce their capital, R&D, and advertising expenditures. It could be argued that, since risk management reduces cash flow volatility, this, in effect, helps firms to invest in these three activities. As a result, the firms acquire a competitive advantage in the market. From a practitioner perspective, Leautier (2007) suggested that risk management enables firms to secure financial flexibility (that supports growth at a minimum cost under adverse business conditions), make

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<sup>1</sup> Culp (2002) provided an overview of the literature on value maximization through corporate risk management.

better business decisions, and leverage the operational flexibility (e.g., pricing and arbitraging) and strategic flexibility (e.g., acquisition and divestment). Having analyzed the shareholders' ability to create value through ERM at both the macro- and microlevels, Nocco and Stulz (2006) suggested that firms that were in the business of taking strategic and business risks could secure a greater competitive advantage by practicing ERM.<sup>2</sup> In addition, such firms could exhibit a superior decision-making capability at several management levels, taking advantage of risk and return trade-offs. However, these studies have been criticized, as they overlooked the irrational behavior of the market and changes in organizational variables that played a significant role in the success or failure of firms' risk management practices.

Previous research has focused on several ERM-related topics, such as the structure and implementation of ERM in the field of insurance (Acharyya and Johnson 2006; Altuntas et al. 2011) and firms' characteristics with regard to the adoption of ERM (Kleffner et al. 2003; Beasley 2005; **[[Beasley 2005 not in Refs]]** Beasley et al. 2008; Liebenberg and Hoyt 2003, Pagach 2011). **[[Pagach not in Refs]]** However, few models exist in the literature for measuring the effectiveness of ERM in terms of value or benefits. Recently Hoyt and Liebenberg (2011) studied the benefits of ERM in the field of insurance. Using data for 117 U.S.-listed life and Property/Casualty insurance companies from 1998 to 2005, they found a positive relationship between implementation and firm value.

This study **[[AU: Correct that you're talking about the present study now, not Hoyt?]]** aims 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 that of non-life companies. Consequently the ERM structure should differ for these two types of insurer. Therefore, we require a different set of data, specific to the type of insurance (i.e.,

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<sup>2</sup> It is important to note the use of risk management terminology in the finance literature. In most cases, reference is made to the market risks (foreign exchange and interest rate risks) and risk management by derivatives only. However, ERM is related to all significant risks (not only financial ones) and pursues a holistic framework. The management of foreign exchange and interest rate risk has become commonplace, so the risk arising from these two sources is unlikely to cause the failure of any organization.

life or non-life) in order to evaluate the value added by ERM. We develop a simple mathematical model to measure the effectiveness of ERM and apply it to the insurance industry. We argue that risk management was not a profit-making function; thus, the value of risk management is not immediately evident. Our results confirm that insurers who practice ERM deliver consistent results under adverse market conditions.

This article is structured as follows. First, we review the literature related to the history of risk, the evolution and practice of ERM, and value creation in the insurance business. Thereafter, we describe the data and methodology used to analyze the impact of ERM on insurance businesses. The analysis of the data and findings are subsequently presented. Finally, we provide a summary and conclusion.

## **2. Literature Review**

In the literature review, we first outline the history of risk management and the evolution of ERM. We distinguish enterprise risk management from generic risk management in terms of its design and effectiveness in creating value for the organization. We argue that generic risk management, which focuses on eliminating downside risk,<sup>3</sup> is insufficient to create value for the entire firm. The finance literature suggests that, in order to secure opportunities, organizations should focus on upside risk management and simultaneously target a reduction in the variability of the earning indicators (e.g., cash flow). Thereafter, we shift our focus to risk management in the insurance industry. We analyze the economics of insurance and the value-adding drivers in the insurance business. We then analyze the literature to reveal how ERM is adopted in the insurance field. The output of this analysis is then utilized to develop a model for determining the value of ERM in the insurance industry.

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<sup>3</sup> By “downside risk,” we mean the type of risk that has the potential to cause damage or loss without any component of opportunity.

Risk is an inherent element for both operational and strategic decision making in all business and policy matters. Historically, in many corporations, risk management has been limited to insurance purchase in order to protect the business from accidental damage arising from specific undesirable events, for example, natural catastrophes, fire, and fraud (Meulbroek 2002b; Nocco and Stulz 2006). In addition, the use of risk management as a tool for hazard mitigation in certain areas, such as health and safety, business continuity, and crisis management, is well known in business. It was in the early 1950s that Markowitz's (1952) **[[Not in Refs]]** work on the mean variance portfolio selection model gave birth to financial risk management. This innovation was then followed by the development of the Capital Asset Pricing model by Sharpe (1964), Lintner (1965), and Mosson (1966)<sup>4</sup> to compute the risk associated with the return on investment in the security market. Thereafter, the Black-Scholes rational option pricing model gave rise to a new set of risk management literature within the discipline of financial economics. In line with the growing sophistication of the risk management tools and techniques, several capital market products (e.g., credit derivatives) were developed. Consequently the traditional insurance mechanism was replaced by financial risk management techniques, such as hedging and securitization (Miller 1992; Rawls and Smithson 1989). The primary goal of (financial) risk management, as Stulz (1996) suggested, "was 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 meant that firms' financial risk management practice aims to eliminate downside risk and reduce the expected cost of financial distress. Stulz (1996) argued that firms' survival during financial and economic crises could also help them to carry out their business in the future under an optimal capital and ownership structure.

The pricing of risk associated with these structured financial products and transferal of risk from one party to another without involving any ownership for extended periods are the key focuses of such risk management activities. This development is in contrast to the insurance risk management technique. Insurers

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<sup>4</sup> These authors are not included in the references, because their work is well established in the field of finance and economics.

underwrite risks and manage them by pooling them together with other risk carriers, where the thrust of gaining ownership of the risk either fully or partially was the ultimate intention of insurance companies. The management of risk has also been considered in the management discipline. The key focus has been the behavioral issues associated with managerial risk taking and the firmwide strategic decision-making process, as advocated by several authors (e.g., Miller 1998; Bromiley 1991).

In a nutshell, the literature has suggested that risk was traditionally managed in silos. In the banking sector, for example, a relatively piecemeal approach has been adopted, focusing on market, credit, liquidity, and operational risk management. In the insurance sector, the risks arising from underwriting, investment, and treasury functions were managed in silos. However, this does not mean that there was no intention among businesses to manage risk within a holistic, integrated framework. In fact, there have been several attempts to do so. In the academic field, the literature on business risk management, as advocated by several authors (Mehr and Hedges 1974; Dickinson 2001; Meulbroek 2002a), eventually discussed the holistic type of risk management. In practice, insurance companies have developed multiline, multiyear products as part of their integrated risk management program for larger clients. Following the development of derivative products in the capital market, several global reinsurers (e.g., Swiss Re, Munich Re) have developed a new technique, Alternative Risk Transfer (ART), for financing some of their high-severity, low-frequency risks (e.g., natural catastrophes) in a nontraditional way by offering insurance-linked security products (Culp 2002). Meanwhile, the large-scale corporate scandals of the early 1990s, together with the banking failures during the 2008 financial crisis, have demonstrated that (1) organizational failure can occur due to a lack of risk management and (2) holistic risk management was a cost-effective function. Consequently, after the 1990s, an increased volume of risk management literature emerged that focused on holistic risk management under the name ERM in business practice, academic studies, and public policy matters. A close study of the literature suggests that the term ERM was actually introduced in practice by

some consulting firms (e.g., Tillinghast Towers Perrin), professional bodies (e.g., the Society of Actuaries), Prudential Standards (e.g., AS/NZS 4360:1995<sup>5</sup> Committee of Sponsoring Organizations [COSO]), and others. In addition, the mergers and acquisitions within and across the industry, and cross-border, as a result of several economic factors, for example, globalization, e-commerce, and regulatory liberalization, caused the risk to businesses to become even greater and more complex. Consequently organizations gradually moved from the traditional silo toward a holistic perspective when integrating their risk management tools and techniques at the corporate level. There were at least four basic characteristics of ERM compared to the traditional way of managing risk, as identified by Culp (2002): (1) efforts toward consolidating financial and nonfinancial risk while separating the core risks of the business from the noncore ones; (2) managing all risks faced by a company by adopting a coherent, common framework (e.g., the Value-at-Risk technique of risk measurement); (3) consolidating the risk management process across the enterprise-wide systems, processes, and people; and (4) developing better integrated, cross-industry risk management products and solutions for managing enterprise risks.

Having identified the generic characteristics of ERM, the study will now focus on accommodating the fundamental economics of insurance business within the ERM program.

### 3. Insurance Economics

In the insurance field, **[[AU: Please check use of present and past tense in this section; are you discussion the business in general, or in the past? I assumed the former.]]** risk management is even more deeply embedded in all business decision making. Ideally, the value of an insurance business is created from three core functions: underwriting (including reinsurance), investment, and finance (including treasury), as argued by Correnti et al. (1997). This includes the

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<sup>5</sup> A multidisciplinary task force of Standards Australia/Standards New Zealand first published this risk management standard in 1995, and subsequent revisions were produced.



interests of both the policyholders and shareholders. Theoretically, insurers' ERM should consider all three of these areas of business. However, in practice, insurers' ERM was aligned with the shareholders' value maximization model. This practice was in line with the theory of rational behavior. 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. This indication assists investors in deciding between 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 differs from that of other financial intermediaries. In fact, policyholders supply working capital to the firm while paying premiums upfront. Consequently, insurers' ERM must not ignore the interests of the policyholders and other key stakeholders in addition to the shareholders. These issues are discussed further below in reference to the value-creation activities of risk management. The following discussion describes in detail the unique nature of the insurance business from the risk management perspective.

On the investment side, insurers who invest most significantly in the equity and property markets might face considerable losses due to a sudden drop in equity prices or a downturn in property values. This might result in a mismatch between asset and liability values. Also, the selection of the investment (i.e., assets) portfolio (which was an issue of risk appetite) constitutes 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 mismatch between currencies when receiving premiums and settling overseas claims. Furthermore, the mismatch between the insurers' statutory financial year, and the underwriting year is a distinct issue in the insurance business.

The ownership structure of insurance companies is also distinct from that of other types of business within the financial industry. Mutual insurers are ultimately

owned by the policyholders.<sup>6</sup> Propriety and casualty insurers are principally owned by the shareholders, and value maximization for the stockholders is their ultimate objective. In contrast, life insurers build up bonus reserves that are ultimately paid out to the policyholders. However, parts of these bonus reserves also count as solvency capital, and hence are at risk if a company suffers financial distress. The conflict between stockholders and policyholders is a unique phenomenon in the insurance business. There was a debate, particularly in the United Kingdom, regarding orphan estates, which are built up to meet the policyholders' 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 appreciate the capital-strengthening initiatives of their insurers, as they can draw the money when needed (Merton and Perold 1993). Hence, the ultimate message of the above discussion is that the conflicting interests of stockholders and policyholders virtually oblige insurers to create value for both stakeholders. The following section will concentrate on the value-creation literature related to the field of insurance.

#### **4. Value Creation in the Insurance Field**

Insurance is a leverage business. Typically, insurers borrow money from the policyholders (i.e., they charge premiums upfront, which is a type of "debt") and stockholders (i.e., risk capital). As discussed earlier, there are three sources of value creation activity in the insurance business: underwriting, investment, and finance with treasury. Insurers' underwrite risks to make profits. These underwritten risks are then diversified through reinsurance and pooling, and the remaining capital is then invested in the capital market to generate a return. However, there are costs associated with borrowing capital (i.e., the 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. On insurers' balance sheets,

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<sup>6</sup> This article excludes mutual companies, although they represented the insurance market extensively, because the mutual insurers have a different type of ownership structure where shareholders do not exist.

both the assets and liabilities represent the market (i.e., economic) value and no secondary market exists for liabilities (i.e., insurance policies). In practice, the cash flows of insurance liabilities are derived from the best estimates by taking into account the time value of money (see Hancock et al. 2001a; Babbel and Merrill 2005). This indicates that insurers' liabilities are exposed to both insurance and investment risks. Hancock et al. (2001b) also pointed out that insurers, in essence, use replicating cash flow techniques to separate these two risks from each other. Ideally, the value of insurers from investment suffer from double taxation (both on return and dividends). However, insurers create value by borrowing money from the comparatively inefficient insurance market over the capital market by taking advantage of the underwriting cycle. This contradicts the financial economics view of value creation.

The allocation of capital is another distinct feature of insurers' financial activities. In order to measure the true profitability, insurers state the capital on an economic basis. Theoretically, economic capital (a part of the shareholder value, together with franchise value, that is, the future expected earnings) is the surplus in the market value of the insurers' balance sheet (the market value of the assets less the market value of the 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 could quantify insurers' investment risk with conditions, this is inapplicable to quantifying insurers' enterprise risk, which essentially includes underwriting and operational elements.

The literature review provides us with the following three key arguments utilized in analyzing the data. First, we assume that the volatility of earnings (i.e., cash flows) is a leading indicator of risk and that 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 earning volatility increases during periods of financial distress and economic crisis. Since risk management is a proactive approach, the earning volatility of ERM practicing firms should decrease over the

longer time horizon. Second, the survival of the firm during crisis events is the ultimate test of a successful ERM program. However, unlike financial risk management, ERM should not focus only on extreme events, but rather on the steady growth of the firm that would ultimately offset the impact of extreme events over the longer time horizon. Third, since ERM aims to maximize the entire value of the firm, the ERM performance measurement model should include the interest of the policyholders in addition to that of the stockholders.

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

## **5. Model, Data, and Methodology**

In this section we specify the variables and data that enable us to undertake an empirical analysis of the impact of ERM on insurance companies' cash flows. Using the three key arguments outlined at the end of the literature review, we develop hypotheses and test them using the empirical data. Our analysis is based on company data rather than market figures, because the company-specific data can help us to capture effectively the impact of implementing ERM on key value drivers. Such an internal measure also helps us to identify how the implementation of integrated risk management over the period studied might reduce the variability under each value driver. The question that we specifically seek to answer is whether risk management that was implemented in an integrated way has a more significant impact on insurance cash flow volatility (Meulbroek 2002b) than that implemented using a silo approach. This cannot be achieved by using market data, because every effect was bundled into a single variable, for example, the share price. Furthermore, the majority of insurance companies are not publicly traded, so, in order to access a large sample, we choose to use company-specific data. This enables us to achieve the purpose of this analysis, inferring the effectiveness

of ERM in reducing the cash flow volatility of insurance companies' key value drivers. The three key value drivers of the insurance companies chosen for the analysis are return on capital and surplus (ROCS), combined ratio (CR), and operational ratio (OR). We computed the ROCS by dividing operating income by the two-year average of capital and policyholder surplus, as shown in the following model:

$$\text{ROCS}_t = \frac{\text{OI}_t}{\frac{\text{CPHS}_{t-1} + \text{CPHS}_t}{2}} \quad (1)$$

In this model,  $\text{ROCS}_t$  is the return on capital and surplus in year  $t$ ;  $\text{OI}_t$ , the operating income in year  $t$ ; and  $\text{CPHS}_t$ , the capital and policyholders' surplus in year  $t$ . It measures how effective a company was in utilizing its contributed capital at time  $t$ . The model is used to measure an insurance company's operational profitability, before capital gains and losses and income tax. It captures how much the company is returning on capital employed, as used by analysts to measure insurance companies' performance, so managers focus on controlling the behavior of this model, as it has a bearing on the valuation of the company. Therefore, this model is ideal for measuring the effectiveness of implementing ERM. The statistical advantage of using this model is that it is based on recurring internal earnings without transitory items, a true reflection of the long-term operational performance. It captures the impact of items like the level and mix of business writings, the geographical orientation, the regulatory environment, the investment philosophy, and the financial market environment, all of which are the primary targets of an effective ERM program. It also captures other factors, such as growth, taxes, expenses, the persistence of reinsurance coverage, and the 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 the insurance field, operational profitability is the single most important source of surplus growth, which is an important element in providing protection against shocks due to unexpected loss events. Moreover, ROCS does not focus only on the return on shareholders' contributed funds, but also on policyholder

protection. This means that maintaining a low volatility of ROCS through ERM would benefit all stakeholders. Therefore, model (1) is considered the best proxy for measuring the impact of ERM, because it is a result of the residual cash flows from operations, divided by the capital required to support these 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 the cash flow volatility consistently until an equilibrium point was reached. We define equilibrium as where the marginal benefit equals the marginal cost of building the risk management infrastructure.
2. We assume that, provided that equilibrium in risk reduction is not reached, reductions in volatility should have been consistently observed over the analysis period.

We first aim to test the hypotheses using model (1), where we seek to establish the relationship between a consistent quality return on capital and surplus and ERM.

In our understanding, the other measures of insurance company performance, such as  $CR_t$  and  $OR_t$ , are less sophisticated, failing as they do to take into account the risk capital supporting the generation of these cash flows. While the combined ratio is a product of the incurred losses and expenses divided by the earned premiums, the operational ratio deducts investment income from the numerator. The ratios used in our analysis are extracted from the A. M. Best Property/Casualty insurance business database for the years 2000 to 2009. The period chosen enables us to capture the trend in 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, thus making it the most appropriate period for our analysis. The criteria set for the selection of a company for our data set were that they have been trading as an authorized insurer in the United States and have all data captured for the entire period on the A. M. Best database. An

analysis of U.S. insurance companies as compared to their European counterparts provided us with a much larger sample size, and we understand that more than 165 insurance companies in the United States have already been practicing an integrated type of risk management for several years, compared to fewer than 20 in Europe (A. M. Best 2009). If a company did not have a reasonable set of complete data under a specific category, it was eliminated. If reasonably complete data were available, we filled out the unavailable data based on the averages in the available dataset for a particular company.

In order to measure the impact of ERM on company performance, we decided to use portfolio standard deviation as a measure of risk, which we believe to be a proxy for measuring insurance companies' cash flow volatility. In essence, standard deviation is a measure of the variability of the outcomes from the expected cash flows, and it captures the level of risk within them. Since reducing the variability in the cash flows of a firm is the main aim of ERM, lower standard deviations (or volatility) could be construed to be one indicator of an effective ERM program. The ratios of the key value drivers, ROCS, CR, and OR, extracted from the A. M. Best database, were used to calculate the standard deviation, over five-year window periods. For example, the standard deviation for each of these three key drivers was computed over six time intervals: 2000–2004, 2001–2005, 2002–2006, 2003–2007, 2004–2008, and 2005–2009. These five-year window periods helped us to calculate the standard deviation/volatility for each company over the window. Therefore, these five-year windows enable us to measure the volatility trends for the period 2000–2009. We measure these 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 terms of their volatility. These results are presented in Tables 1–3. This was a simple, robust methodology and was the first to be used to measure the effectiveness of ERM on insurance company performance.

## 6. 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 affected the key value drivers in non-life insurers. In this case, the stability or resilience of the value drivers to movements in risk factors is used as a proxy for explaining the benefits of implementing an effective ERM structure.

The intuition is that an effective ERM infrastructure helps to stabilize the long-term bottom line of an insurance company's operations. The level of assimilated resilience determines the capability of an infrastructure to handle risk. This capability is built over time and matures as the infrastructure becomes embedded in the 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 is used as a tool for competitive advantage. This inflection point is reached when the marginal benefits are equal to the marginal costs of maturing an ERM infrastructure program.

The point of equilibrium in the insurance industry had not yet been attained, as a survey conducted by KPMG (2010) showed that many companies had not yet fully implemented ERM. Therefore, the volatility in the key drivers might still have fallen 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 for ROCS, as this is the main scientific value driver used by insurance companies to measure their performance (A. M. Best 2009). The other two measures, CR and OR, are not scientific in nature, but should give a good indication of the direction and extent to which the volatility in the underlying portfolios was changing over the analysis period, in the face of ERM.

The results of the analysis are reported in Tables 1–3. The results relate to the test of the relationship between ERM and changes in the volatility of the key



value drivers in a non-life insurance company's return on capital and surplus (ROCS), combined ratio (CR), and operating ratio (OR), respectively. The empirical testing of the impact of developing an ERM infrastructure was achieved by comparing the change in volatility between two five-year volatility windows over a period of 10 years. A company is adjudged to have successfully augmented the ERM infrastructure in its operations if there is evidence of a reduction in the standard deviation for the value drivers analyzed in this study. The results shown in Tables 1–3 support the hypothesis that ERM reduces firms' risk when implemented efficiently and that it becomes more efficient as it matures.

**Table 1**  
**Changes in the Volatility of ROCS**

Window Period	Changes in Volatility												
	Reduction of Volatility ( $-\Delta$ )							Increase of Volatility ( $+\Delta$ )					
	<i>N</i>	<i>n</i>	Me an	Mini mu m	Maxi mum	Ra nge	SD	<i>n</i>	Me an	Mini mu m	Maxi mum	Ra nge	SD
	Changes in the Volatility of ROCS												
April 2000– May 2001	7 8 4	4 0 2	-4. 21 %	-44. 02%	-0.0 1%	44. 02 %	7.0 2%	3 8 2	3.0 1%	0.00 %	28.2 0%	28. 20 %	5.2 5%
May 2001– June 2002	7 8 4	4 9 9	-4. 23	-63. 48	-0.0 1	63. 47	6.7 7	2 8 5	3.5 1	0.00	99.7 5	99. 75	9.0 1
June 2002–July 2003	7 8 4	4 8 5	-4. 45	-80. 13	-0.0 1	80. 12	7.5 6	2 9 9	3.2 7	0.00	40.9 7	40. 98	6.5 7
July 2003– August 2004	7 8 4	3 0 2	-6. 41	-42. 64	-0.0 3	42. 61	7.7 7	4 8 2	21. 77	0.00	496. 86	496 .86	42. 58
August 2004– September 2005	7 8 4	3 6 6	-3. 96	-24 3.13	-0.0 1	243 .13	16. 14	4 1 8	4.6 2	0.00	390. 22	390 .23	4.6 2

In Table 1 (the changes in the volatility of ROCS), the results show that there were two sides to the story. On one side, the story is that of companies experiencing a reduction in volatility while, on the other, that of companies exhibiting increases in volatility. The period from 2000 to 2008 saw the average risk in non-life insurance companies reduced by 4.21% at the beginning of the adoption stage and peaking at 6.41% for the period from 2003 to 2008. This is also evident from the range of the level of reduction experienced during the same period (2000–2008), from 44.02% 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 with an average 9.05% reduction of volatility over the entire period of time. The number

of companies reducing their risk levels during the financial crisis period increased by 64 from 302. This period also saw the largest reduction of risk (243.13%). The resilience of the ERM programs implemented during the period of the study attest to the benefits of implementing embedded ERM infrastructures.

In contrast, the companies with higher volatility range and standard deviation failed to embed ERM in their day-to-day operations. A study by Smithson and Simkins (2005) showed that risk management reduced the sensitivity of cash flows to risk factors. These companies show a higher than average risk during the periods 2001–2006 and 2003–2008. These were periods when the insurance markets were affected by catastrophic losses and the global financial crisis. The average volatility was 0.50% and 18.50% higher during these two periods, respectively. This was also matched by respective standard deviations of 9.01% and 42.58%. The higher than expected volatility and wider volatility range are evident in companies that were less resilient to movements in risk factors. It can be construed that these were companies that failed fully to embed ERM within 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 in which the portfolios of those companies that had been reducing their risk by better managing it were more resilient to extreme movements in risk factors. Companies in this category experienced an even greater reduction in risk over these periods than their counterparts that showed a heightened risk.

**Table 2**  
**Changes in the Volatility of CR**

Window Period	Changes in Volatility													
	Reduction in Volatility (-Δ)							Increase in Volatility (+Δ)						
	N	n	Mean	Minimum	Maximum	Range	SD	n	Mean	Minimum	Maximum	Range	SD	
	Changes in Volatility on Combined Ratio (CR)													
April 2000– May 2001	784	44	-8.02	-24.191	-0.01%	241.91%	24.45%	350	4.45%	0.00%	214.09%	214.08%	14.02%	
May 2001– June 2002	784	49	-4.96	-17.492	0.00	174.92%	11.50%	285	4.21%	0.00	108.51%	108.51%	10.22%	
June 2002– July 2003	784	47	-6.31	-28.492	2.52	287.44%	20.20%	327	4.37%	0.00	219.03%	219.03%	14.15%	

July 2003– August 2004	7 8 4	3 7 9	-6 .2 6	-36 2.00	-0.0 2	361. 98	23. 75	4 0 5	5.7 1	0.00	126. 13	126. 13	12. 99
August 2004– September 2005	7 8 4	2 7 4	-4 .6 5	-87. 21	-0.0 1	87.2 0	8.8 8	5 1 0	6.9 4	0.00	370. 12	370. 12	20. 77

**Table 3**  
**Changes in the Volatility of OR**

Window Period	Changes in Volatility												
	Reduction in Volatility (-Δ)							Increase in Volatility (+Δ)					
	<i>N</i>	<i>n</i>	Me an	Mini mum	Maxi mu m	Ran ge	SD	<i>n</i>	Me an	Mini mu m	Maxi mu m	Ran ge	SD
	Changes in the Volatility of OR												
April 2000– May 2001	7 8 4	3 6 0	-9. 25 %	-44 9.66 %	-0.0 1%	449. 65 %	34. 08 %	4 2 4	4.9 2 %	0.00 %	100. 05%	100. 05 %	11. 99 %
May 2001– June 2002	7 8 4	4 1 0	-5. 85	-29 1.85	-0.0 1	291. 84	18. 44	3 7 4	4.9 7	0.00	169. 61	169. 61	14. 61
June 2002– July 2003	7 8 4	3 3 0	-7. 37	-24 5.24	-0.0 1	245. 23	21. 24	4 5 4	11. 24	0.00	333. 35	333. 35	29. 42
July 2003– August 2004	7 8 4	3 3 7	-5. 25	-97. 70	-0.0 1	97.6 9	13. 02	4 4 7	8.5 1	0.00	204. 85	204. 85	21. 40
August 2004– September 2005	7 8 4	3 3 8	-7. 27	-31 0.96	- 0.01	310. 95	27. 05	4 4 6	7.8 4	0.00	265. 05	265. 05	25. 00

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The observations made about Table 1 are quite different from the results shown in Tables 2 and 3. These measures are crude and unscientific in nature. They show an inconsistent picture of the reductions and increases in volatility during the study period, due to the fact that these value drivers failed to capture the full effect of ERM from a portfolio perspective. In the true spirit of ERM, the value measures capture only part of the whole story. They consider only 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 was bottom line centric. The failure of 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, while volatility in the three key value drivers was falling, it did so only in a consistent manner under ROCS. While the other two variables contributed to the reduction in risk, ROCS better explains the relationship

between value creation and ERM. Their contribution to the bottom line emanated from an operational view point, which was only one component of strategy setting under the COSO framework and the balanced scorecard system. The diversification benefits brought about for the whole portfolio are inadequately captured by these two crude variables. ROCS captures every element of how the organization operated 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 fed into the financial perspective, which is captured by ROCS. The financial perspective shows how the company was 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 would lead to a satisfied customer base, which would indirectly impact on 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 a reduction in volatility increased during the period and those exhibiting increased volatility (+ $\Delta$ ) also trended toward a higher volatility during the same period. Table 1 shows that the average changes in volatility for those companies that we construed as yet to adopt ERM increased from 3.01% to 21.77% during the period of the study (2000–2009). One plausible explanation might be that those companies that had failed fully to implement ERM tended to experience huge swings in volatility when faced with catastrophic losses in 2005 and the financial crisis in 2008/2009. In fact, during the analysis period (2000–2007), the U.S. Property/Casualty insurance market experienced the worst disasters in history, starting with 9/11 in 2001, a fall in the stock markets in 2001–2002 due to the dot.com bubble bursting, hurricanes Charley, Ivan, Frances, and Jeanne in 2004, hurricanes Katrina, Rita, and Wilma in 2005, and culminating in the financial crisis of 2007–2009. According to Towers Perrin (2005), **[[Not in Refs]]** of the insured losses from Katrina, 47–53% were borne by insurers and 52–44% by reinsurers, which amounted to \$18.8–28.9 billion and \$20.7–24 billion, respectively.

**Figure 1: Reduction in the Volatility of the Three Value Drivers in Terms of the Number of Insurance Companies**

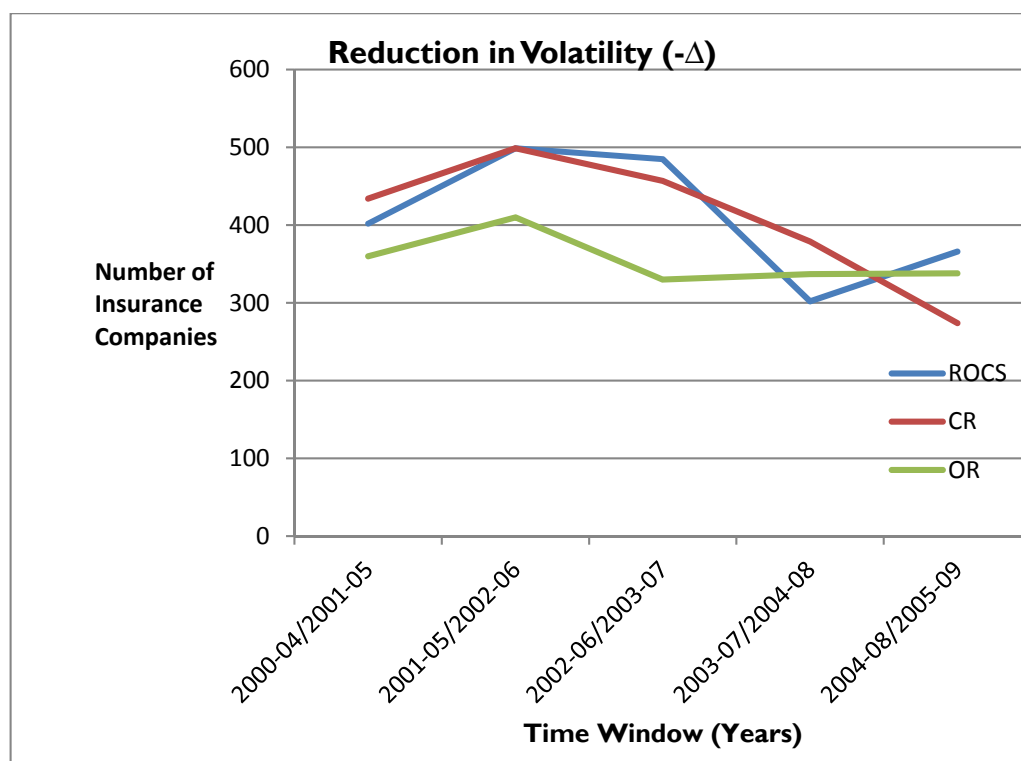


Figure 1 shows a comparison of the reduction in volatility with regard to the number of insurance companies in each five-year time window for all value drivers. This shows that the number of companies increases as the volatility reduces after 2008 only for ROCS. We take this trend to be a true reflection of the market phenomena, as the majority of insurers were adversely affected by the 2008 financial crisis. However, this fact is not properly recognized by the other two value drivers. This validates our assumption that ROCS constitutes 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, in the light of the results presented in Tables 1–3, we conclude that those companies that successfully adopted ERM early consistently experienced reductions in volatility across all of the value drivers, irrespective of the market conditions during this period. Those companies that were yet to adopt ERM fully showed a trend toward higher magnitudes of cash flow volatility across all drivers over the same period of analysis than those that had already done so.

Consequently, in line with our argument above, our conclusion is that silo risk management is futile, in that it fails effectively to mitigate long-term cash flow

volatility in non-life insurance companies. This result confirms the hypothesis that companies that failed to adopt ERM in its entirety faced worse results than those that had done so, both under normal business conditions and when faced with value-depleting catastrophic events.

## 7. Conclusion

The objective of our study was to test whether or not ERM added value to insurers. Using a substantial amount of U.S. Property/Casualty insurance companies' data, we have found that insurers that adopted ERM managed consistently to lower the volatility in their key value driver, 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 those insurers who practice ERM to track the volatility in their portfolios and find ways of minimizing it, and hence their ability to deliver consistently stable portfolios in the face of adverse market conditions. This study shows that ERM had a significant impact on those insurance companies that adopted it effectively. We confidently conclude that the adoption of ERM by insurance companies enables them to reduce their risk and add value for both their shareholders and policyholders.

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