ERM and Actuaries

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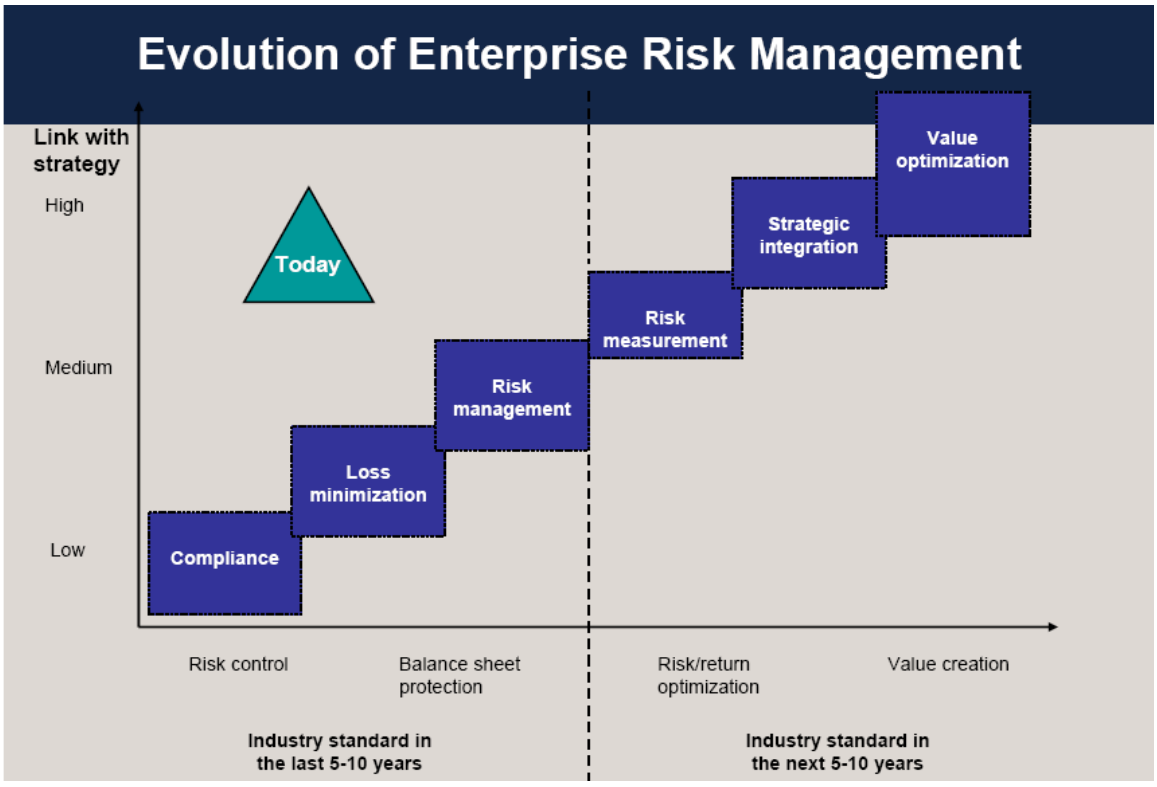
Enterprise Risk Management is both new and old. Actuaries have always been highly involved in risk management and they have much to learn about the new field of Enterprise Risk Management. These seemingly contradictory statements are the subject of this paper. This paper is an attempt to create a context for the understanding of ERM that can identify both the historic and new roles for actuaries and other risk professionals in managing risks for any type of firm.

THREE TYPES OF ERM

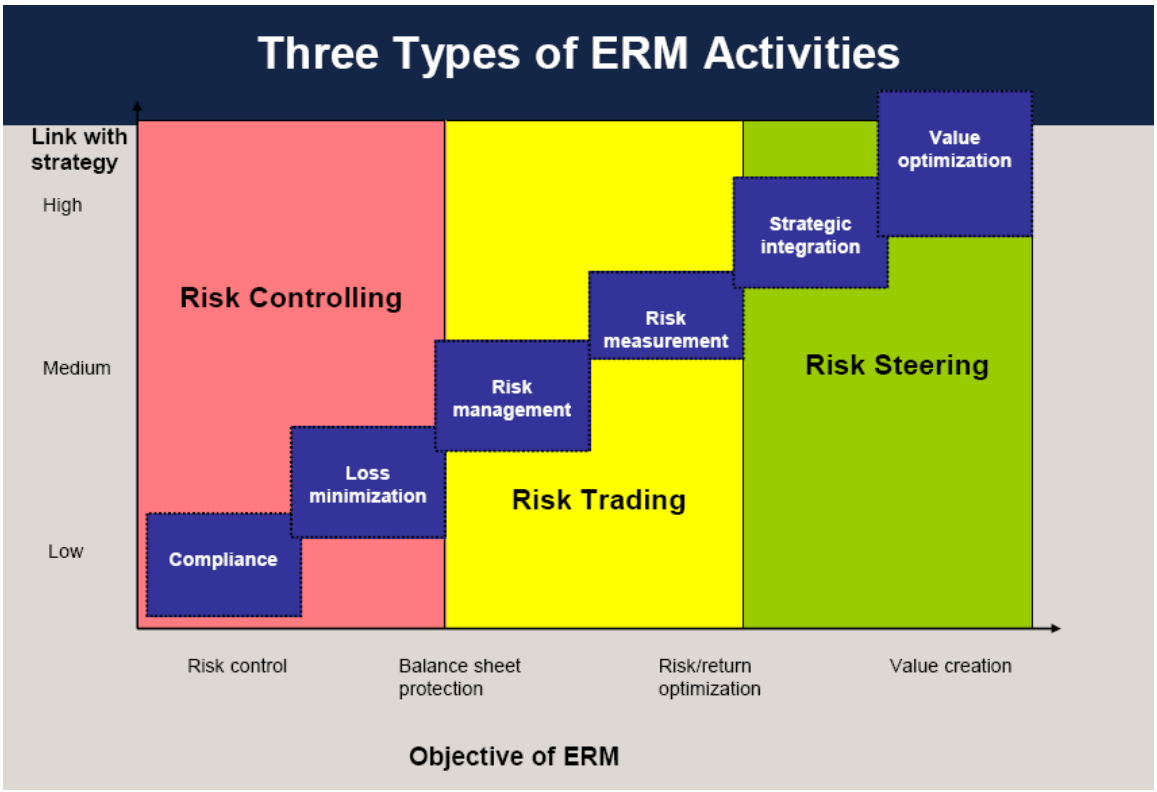
The activities of Enterprise Risk Management can be grouped into three broad areas. Those are Risk Controlling, Risk Trading and Risk Steering. Some discussions of these three types of risk management present them as a progression for less advanced to more advanced activity.



This chart (adapted from Mark Puccia Standard & Poor's presentation) shows a progression from risk management programs that are risk control oriented through programs that feature risk management and measurement to ultimately evolve to value creation and optimization activities.

The three areas of risk management that are mentioned above can be seen as groupings of the six

boxes on this stairway.



These three types of ERM activities have different objectives and different firms have applied these types of ERM with different degrees of emphasis.

Risk Controlling is a fundamental activity that seeks to restrict exposure to potential losses or risks. Almost all business activities include some amount of risk control activity. In insurance companies, the major risk controlling activities included underwriting of insurance risks, underwriting of credit risks, authority limits and exposure limits for each of those areas. It also included internal audit and other functions for controlling operational risks. Eventually, some firms added in controls around other risks such as interest rate and equity risks using ALM and hedging as a risk control processes. In banks, the same sorts of credit and operational risk controlling activities existed. In non-financial firms, there was often a large added physical component to loss controlling. Safety and industrial engineering programs worked on physical risks. In addition, many non-financial firms have large exposure to physical property risks that are insurable. So management of an insurance program became a major risk control process. In addition, there are supply chain and raw materials risks. These are managed by a variety of techniques, including but not limited to hedging. And in all firms, managing foreign exchange and liquidity risks were practiced to varying degrees.

Most commonly, these risks were management completely in isolation by specialists in each particular risk element. This is the most traditional picture of risk management. The new part of risk controlling that ERM brings is the possibility of bringing all of these risks to the same table, looking at them on some comparable basis and determining the degree to which a firms wants to retain or reduce exposure to risks on a consistent basis from a top down point of view.

Actuarial involvement in risk controlling has traditionally been limited. Actuaries have worked as underwriters and as investment managers in insurers but that has mostly been stepping outside of the actuarial role into another specialty. Actuaries have taken more prominent roles in development and monitoring of limits in areas such as cat risk, where the measurement depended on complex models. Those models also require collaboration with scientists who are specialists in the specific catastrophes. Actuaries play a major role in ALM and hedging of insurance exposures there also usually in collaboration with specialists in the investments that make up half of the equation.

The new role for actuaries in risk controlling is the development, maintenance and interpretation of comprehensive risk models that can be used to bring all risks onto the same basis for top level discussion and ultimately the determination of overall risk tolerance and decisions on which risks to retain to use up that tolerance. The first awakening from this process is the first time glance at the actual risk profile of the firm and the realization that some risks are managed very tightly while others are quite the opposite. Once that discussion has been held, actuaries than also have a role to help to translate that risk tolerance back into measures that are more familiar to managers in each risk area.

Risk controlling is the area of ERM that is addressed by COSO and AS/NZ Risk Management Standard. It is often dismissed by actuaries as being of relatively little importance or not even a part of ERM. However, the risk management activities of most non-financial firms fall largely into the area of risk controlling.

When actuaries look at potential roles outside of financial services for ERM activities, there needs to be recognition of the large amount of physical risk that is present in many non-financial firms that actuaries are totally unprepared to help manage. These risks are most often managed by engineers or people with similar backgrounds.

Many firms will never go beyond risk controlling in their risk management programs. And that might well be the best use of management time and resources. That will depend on the major limiting factor of the firm. Financial firms are usually faced with capital as a major limiting factor and retained risk as a major driver of capital needs. So financial firms must have risk and risk management at the heart of many management discussions. For non-financial firms, risk will influence need for cash or access to cash and availability of cash and capital, but there may be other

much more important limiting factors. In the recent times, more and more firms have leveraged themselves more and more creating a situation where risk and the resulting volatility in cashflow needs are now of very high importance. But there are other firms, such as the large well established technology firms that are awash in cash and have plenty of capital but have very different key limiting factors that push risk management to a lower level on the priority list which means that risk controlling is the only type of risk management that will be undertaken.

As the actuarial profession seeks to promote an "all industry" approach to professional involvement in risk management, these factors need to be taken into account. And in addition, the most likely area of actuarial involvement, for creation of comprehensive risk models needs to be developed into a practice area where an actuary could be able to learn from established methods for modeling of all risks. These methods have not been established, which makes it extremely difficult to sustain a standard of professionalism that is equivalent to traditional areas of actuarial practice.

RISK TRADING

Risk Trading is the second major type of ERM activities. Modern ERM can be traced to the trading businesses of banks. Hard lessons from uncontrolled risk trading led to the development of processes and standards for controlling the traded risks. A major element in these systems is the function of valuing, or in other words, pricing of risks. For this paper, all activities that include the deliberate acquisition of risks for the purpose of making a profit by management of a pool of risks to be risk trading. With that definition, insurance and reinsurance companies can be seen to be pure risk trading firms. And actuaries are at the heart of this activity as major players in the pricing and valuation of insurance risks. With this way of organizing risk management activities, it is clear that most actuarial is and has always been risk management. In fact, as usually boasted, actuaries probably have over 100 years more experience in risk management than any others active in this part of the field of risk management.

ERM changes the risk pricing by introducing a consistent view of pricing of risk margins across all risks. For actuaries and insurance products this has taken the form of economic capital and cost of capital pricing.

But the activity in this area that has developed in banking and that has, until very recently, been driving regulatory thinking has gone in different directions than actuarial risk trading. Actuaries have entered into parallel activities, but most often with totally different objectives.

At a fundamental level, actuarial practice has been organized along the basic insurance principle of diversification. Risk pricing for insurers has been a compromise between the cost of risk to the customer with a highly specific risk and the cost of risk to the insurer with a diversified pool of risks.

The banking approach to risk trading has been that of replication. It is an extension of the fundamental activity of trading away market inefficiencies of prices between different markets. Risks are taken and offset. Banks keep the difference between one version of a risk and a replicating position based on other securities. Different risk trading strategies employ different degrees of replication. The closer the strategy is to exact replication, usually the lower the margin per trade. For example, Long Term Capital Management used a trading strategy firms developed at Solomon Brothers that offset positions in 20 year treasuries with positions in 19 year treasuries. Other risk trading employed by banks is the so called "carry trade" where the banks borrow funds in a currency with very low interest rates (most often Japan in recent years) and lend those same funds in a market with higher interest rates, usually for a much longer term.

One of the underlying principles of bank trading risk management is liquid markets for risk. Another major principle is the atomization of risk and the dispersal of risk. This is seen as a solution to a classic bank problem of risk concentration. Historically, banks operated locally and had very highly concentrated loan portfolios that focused on their local businesses. Atomization of risk, usually referred to as securitization, allows for drastic reduction in the risk concentration of banks.

Actuaries use very similar techniques to bank risk trading when they do ALM and hedging. However, similar seeming activities are classified as risk controlling for insurers and trading for banks. This is because in most cases, banks do risk trading to achieve profits while insurers do ALM and hedging to reduce or eliminate risk. This is fairly arbitrary and the reader can decide that form of activity, rather than objective of activity is the more important classification criteria.

It is important note that bankers and bank regulators have been very vocally promoting the risk management practices that have been devised for their risk trading as THE platform for all risk management. In fact, they have struggled mightily to force the credit and operational risks of banks into this framework. Meanwhile, insurers and insurance regulators have also been drawn into this path as well.

The idea is that trading of all risks will enhance the risk management of all risks. And even if there is no trading of a risk, that the best course of action for risks that are not traded is to pretend that they are traded.

This approach has caused the management of many, many non-financial firms to conclude that risk management does not apply to them. They would contend that their risks do not even slightly fit into the risk trading model. This discussion is intended to show how they fit into ERM and this author heartily agrees that most risks will not ever fit into a risk trading model.

Recent events perhaps call into question the entire risk trading model of banks. The idea that

inexact replication can be a reliable activity can only be supported if it is believed that the degree of residual risk can be determined reliably. However, there have been repeated market events that show that periodically, the small and moderate amounts of expected residual risk can become mammoth when economic activity falls into a transition period between predictable regimes.

Another major difference between the actuarial approach to risk pricing and the banking approach is the reference basis. Actuarial pricing and valuation tends to reference the cashflows in a fundamental analysis approach to risk. Banking pricing and valuation tend to reference other prices.

In recent years, actuaries have been heavily criticized and self critical because of the failure to sufficiently reference market prices. One problem for actuarial valuations has been the treatment of market risk margins. When actuaries cannot find a cahsflow basis for risk margins, those margins are treated as any other cashflows and are then a positive contribution to value. This leads to the illogical result that an investment with a large risk margin that was purchased for $100 would be considered to be worth $120 immediately by the actuarial valuation.

In addition, and even more important to a discussion of risk management, actuaries were valuing risky options that were implicitly granted inside of an insurance contract at values much, much lower than the price of replicating options purchased in the financial markets. In some cases, actuaries were underestimating both the expected losses from the options and the risk margins.

However, the recent credit crisis shows that market evaluations of risk margins are not perfect either. In the period preceding the sub prime meltdown, market based margins for risk for many financial instruments were at or near historical lows. A fundamental evaluation of the potential risk would have suggested that the market was not paying appropriately for taking risks.

Risk trading is also done by some of the non-financial firms that have built trading platforms to support hedging of their raw materials costs. These firms seek to get profits from the insights into the movements in market prices and their knowledge of the actual activities related to the underlying goods. Enron was the largest proponent of this activity. Many other firms have continued in these practices after the demise of Enron, but in a much more controlled fashion.

RISK STEERING

Management has always looked to choose strategies that enhance firm value. ERM provides an entire new and more quantitative approach to this high level activity.

At the macro level, management will leverage the risk and reward information that comes from the ERM systems to optimize the risk reward mix of the entire portfolio of insurance and investment risks that they hold. Proposals to grow or shrink parts of the business and choices to

offset or transfer different major portions of the total risk positions can be viewed in terms of risk adjusted return. This can be done as part of a capital budgeting / strategic resource allocation exercize and can be incorporated into regular decision making. Some firms bring this approach into consideration only for major ad hoc decisions on acquisitions or divestitures and some use it all of the time.

There are several common activities that may support the macro level risk exploitation:

Economic Capital. Realistic risk capital for the actual risks of the company is calculated for all risks and adjustments are made for the imperfect correlation of the risks. Identification of the highest concentration of risk as well as the risks with lower correlation to those higher concentration risks is the risk information that can be exploited. Insurers will find that they have a competitive advantage in adding risks to those areas with lower correlation to their largest risks. Insurers should be careful to charge something above their "average" risk margin for risks that are highly correlated to their largest risks. In fact, at the macro level as with the micro level, much of the exploitation results from moving away from averages to specific values for sub classes.

Risk Adjusted Product Pricing. Product pricing reflects the cost of capital associated with the economic capital of the product as well as volatility of expected income. Product profit projections show the pure profit as well as the return for risk of the product. Risk adjusted value added is another way of approaching this that has the advantage that it does not favor shrinkage of the business as a rate driven risk adjusted rate of return does.

Capital Budgeting. The capital needed to fulfill proposed business plans is projected based on the economic capital associated with the plans. Acceptance of strategic plans includes consideration of these capital needs and the returns associated with the capital that will be used. Risk exploitation as described above is one of the ways to optimize the use of capital over the planning period.

Risk Adjusted Performance Measurement (RAPM). Financial results of business plans are measured on a risk-adjusted basis. This includes recognition of the economic capital that is necessary to support each business as well as the risk premiums and loss reserves for multi-period risks such as credit losses or casualty coverages.

Risk Adjusted Compensation. An incentive system that is tied to the risk exploitation principles is usually needed to focus attention away from other non-risk adjusted performance targets such as sales or profits. In some cases, the strategic choice with the best risk adjusted value might have lower expected profits with lower volatility. That will be opposed strongly by managers with purely profit related incentives. Those with purely sales based incentives might find that it is much easier to sell the products with the worst risk adjusted returns. A risk adjusted compensation situation creates the incentives to sell the products with the best risk adjusted returns.

A fully operational risk steering program will position a firm in a broad sense similarly to an auto insurance provider with respect to competitors. There, the history of the business for the past 10 years has been an arms race to create finer and finer pricing/underwriting classes. As an example, think of the underwriting/pricing class of drivers with brown eyes. In a commodity situation where everyone uses brown eyes to define the same pricing/underwriting class, the claims cost will be seen by all to be the same at $200. However, if the Izquierdo Insurance Company notices that the claims costs for left-handed, brown-eyed drivers are 25% lower than for left handed drivers, and then they can divide the pricing/underwriting into two groups. They can charge a lower rate for that class and a higher rate for the right handed drivers. Their competitors will generally lose all of their left handed customers to Izquierdo, and keep the right handed customers. Izquierdo will had a group of insureds with adequate rates, while their competitors might end up with inadequate rates because they expected some of the left-handed people in their group and got few. Their average claims costs go up and their rates may be inadequate. So Izquierdo has exploited their knowledge of risk to bifurcate the class, get good business and put their competitors in a tough spot.

Risk Steering can be seen as a process for finding and choosing the businesses with the better risk adjusted returns to emphasize in firm strategic plans. Their competitors will find that their path of least resistance will be the businesses with lower returns or higher risks.

JP Morgan in the current environment is showing the extreme advantage of macro risk exploitation. In the subprime driven severe market situation, JP Morgan has experienced lower losses than other institutions and in fact has emerged so strong on a relative basis that they have been able to purchase several other major financial institutions when their value was severely distressed. And by the way, JP Morgan was the firm that first popularized VaR in the early 1990's, leading the way to the development of modern ERM. However, very few banks have taken this approach. Most banks have chosen to keep their risk information and risk management local within their risk silos.

Actuaries play a key role in providing the information for risk steering with economic capital and return/value modeling.

This is very much an emerging field for non-financial firms and may prove to be of lower value to them because of the very real possibility that risk and capital is not the almost sole constraint on their operations that it is within financial firms as discussed above.

Implications for Actuaries

This framework shows how much actuarial work can be seen as risk management.

It also shows very briefly summarizes the differences between traditional actuarial work and

ERM.

The framework shows the ERM work that is not now performed by actuaries, the risk management work that is not performed by actuaries and the work that arises from a shift to ERM that could be undertaken by actuaries.

Actuaries need to consider how the profession should relate to the areas of risk management where actuaries are not primary players but have related roles. These areas exist within insurance and include some of the largest risks such as equity risk, credit risk, underwriting and operational risk.

Actuaries need to consider how the profession should relate to areas of risk management where actuaries currently have no current connection.

	Banks	Insurers	Non Financial	Main Idea
Risk Controlling	– Basel II – has risk controlling focus, but thinking is trading risk based. – Credit Risk management has traditionally fallen here, but with advent of credit trading (CDS) has been moving it into Risk Trading. – ORM should be in this box, trading risk focus of banks forces ORM into a trading risk approach.	– Solvency 2– has risk controlling focus, but thinking is copy of banking risk trading approach. – RBC – Underwriting Standards – Investment Policies – ORM is developing – ALM & Hedging – Reinsurance	COSO Cost benefit approach to risk management. Insurance is primarily a risk controlling tool.	To keep risk within tolerance. To limit potential losses. Main tools are underwriting/risk selection and loss control activities to reduce frequency & severity of unavoidable losses. Works with gross positions. Starts as silos. Eventually in aggregate.
Risk Trading	– Market Risk of trading books – Valuation models – Focus is solely on getting market price and volatility of market price. – Usually no fundamental analysis of risks	– Most insurers have buy and hold approach to risk – Some do trading of market risk for profit – Pricing of many insurance products – Valuation of insurance risks – Initially based solely on fundamental analysis of risks – Shifting to market price of risk	– Applies only to hedging of raw materials and prices of products. – Non-Financials not familiar with controlling of trading risks leading to frequent mismatches between risk appetite and hedging positions.	To get the prices right on risks to make trade-offs. Starts in Silos. Eventually consistent across risks. To limit net positions. Tools are risk structuring & risk trading. Counterparty risk becomes key.
Risk Steering	Not usually A few banks use RAROC With risk trading view Risk Steering doesn't make sense, since positions change constantly. All risk management is seen to be tactical.	Some trying to use EC & RAROC or EC & cost of capital in Embedded value	Not usually considered by non-financials Rarely is there any clearly articulated risk reward trade-off standards.	To balance aggregate risks & understand aggregations and diversifications in the businesses in order to improve the spread for risk and the return for net firm-wide risk.
Comments	Banks started with Risk Trading and they are trying to force all of their ERM activity into a trading framework	Insurers try to copy bank ERM, but it doesn't translate well because they are predominantly buy & hold risk takers. May cause insurers to shift to more risk trading.	Non-Financials protest the application of trading centered bank ERM ideas to their businesses where very few of the risks are traded.	