

ENTERPRISE RISK AND MANAGEMENT INCENTIVES

Paradigm shifts are hard to predict, but they offer great opportunities when correctly foreseen. Many financial professionals, including actuaries, are examining the risk of the enterprise. The focus on enterprise risk management has met a warm reception: corporate executives, boards of directors, regulators, and rating agencies support the new endeavor.

Enterprise risk management (ERM) has little effect on the personal insurance consumer, who will continue to buy auto and Homeowners coverages. For corporate consumers, and even more for insurers and reinsurers, ERM may change the services bought and the products provided. The largest effect may be on the actuarial societies, for two reasons:

- Employers seeking professionals with expertise in enterprise risk management will look to educational organizations that grant degrees in ERM. Actuaries may be highly qualified for risk analysis, but the years spent on insurance studies may be seen as a distraction. By granting degrees in ERM, societies create reputations for themselves.
- A growing concern with financial risk has led to convergence among several societies. The CFA, SOA, CAS, and GARP societies define their members as risk specialists, not constrained to specific industries. Employers can not judge the quality of professional education. If one society grants degrees in ERM, other societies must do so as well.

ONCE AND FUTURE PARADIGMS

Risk has always been a mainstay of financial analysis. Investment analysts assume they have solved the risk-return conundrum. The expected return on a portfolio depends on its systematic risk, which is the risk that is not diversifiable. Analysts differ on the exact attributes of systematic vs unique risk. But the link of return to systematic risk is based on strong arbitrage arguments. Risk can be measured, quantified, and priced.

Some proponents of enterprise risk management have no quarrel with this perspective. ERM is financial risk analysis writ large:

- Investors analyze financial call and put options, ERM deals with real business options.
- Investors speak of efficient security frontiers, ERM speaks of efficient frontiers of business strategies.
- Investors optimize asset portfolios, ERM optimizes asset-liability portfolios.

Other proponents of ERM discard the investment perspective, which they perceive as too narrow. They use utility theory, risk aversion, and behavioral finance to link reward to risk. Actuarial science studies risk loads for insurance, which ERM extends to the general operations of a firm.

But ERM is neither modern portfolio theory writ large nor a replacement for portfolio theory. As the name implies, it extends risk from the investor to the enterprise.

Well-diversified investors are not troubled by diversifiable risk, since this risk (by definition) has been eliminated from their portfolios. Other investors follow the lead of well-diversified one and deal only with systematic risk, since additional return for other risks provides arbitrage opportunities to well-diversified investors.

But the behavior of stock prices is not the behavior of the enterprise itself. The enterprise is run by managers, not by diversified investors. The enterprise itself can not diversify. For the managers, enterprise risk management is critical.

We do not imply that the firm receives additional reward for other risks, which it passes on to its owners. The investors in any firm can diversify, and the investors do not receive additional return for diversifiable risk. But the firm's managers avoid risks that are inimical to their own interests even if they are of no concern to the investors. Avoiding these risks reduces their returns, but the lower return is not subtracted from shareholders. The shares of manager-run corporations are reduced for the expected lower returns, so the return to the shareholders reflects its systematic risk.

MANAGERS VS INVESTORS

Financial economists speak of the principal agent problem: the different interest of principles and the agents whom they hire. It take myriad forms, so it is hard to quantify. It affects corporate governance, manager compensation, and performance measurement.

Managers avoid risks that shareholders are willing to assume, and they assume liabilities that shareholders would not.

- Shareholders avoid systematic risk that can not be diversified unless they are compensated by higher returns. They willingly assume diversifiable risk, particularly if it is accompanied by high returns.
- Managers' most valuable asset is their jobs. Most senior managers would not find jobs at comparable pay if they lost their current positions, and their foremost concern is to retain their jobs.

The principal agent problem is most evident in corporate efforts to diversify their products and smooth their earnings. Shareholders prefer managers to focus on their strengths. High earnings are desired even if they are volatile, as long as the volatility is not systematic risk.

The principal agent problem is most severe is decisions about the assumption of risk. A manager may be highly concerned about labor strife, even if shareholders are willing to assume the unique risks of possible work stoppages. Managers are too willing to assume large future costs for pensions and post-retirement health care which come due after the manager has retired, though these costs lower future earnings and current share prices.

ERM uses risk analysis to mitigate agent principal problems and raise returns. ERM focuses on principles of financial economics drawn from several disciplines that affect corporate behavior. It revises risk decisions so that

- Behavioral decisions are left with persons having the greatest incentive to reduce cost.
- Risk assumption is left to persons with incentive to reduce systematic risk, not unique risk.
- Performance measurement systems focus on expected profits, not unique risk.
- Unique risks are diversified at the lowest possible cost.

ERM applies to all industries; it is not specific to insurance. ERM extends risk control from insurance products to behavioral incentives. We illustrate many of its principles with insurance pricing, since readers are most familiar with this subject. But our success with ERM depends on shifting from an insurance paradigm to an incentives paradigm. As risk managers learn to transform business incentives to deal with risk and uncertainty, ERM shifts from traditional (actuarial) solutions to more effective behavioral changes.

BEHAVIORAL DECISIONS

Traditional insurance products are helpful in some ways and detrimental in others. Actuaries quantify the financial effects, but may ignore the behavioral incentives.

Illustration: Seat belts prevent serious injuries, so drivers wearing seat belts are less fearful of potential accidents and more enticed by the benefits of speed. A driver wearing a seat belt has a lower risk of being seriously injured and a higher probability of injuring others.

- If no drivers wear seat belts, all drivers fear injuries and drive more slowly.
- If all drivers wear seat belts, they drive more rapidly and have more accidents.

Economists speak of this as a negative externality. Seat belts change consumers' behavior to adversely affect others. They cause more physical accidents, but it is unclear if they cause more or less bodily injury. Some economists say they raise the total injury costs.

Seat belts are a safety device meant to curb risk that changes drivers' incentives and increases risk. Applied to insurance coverage, underwriters speak of this as morale hazard.

Illustration: Flood, earthquake, and windstorm coverages – especially when provided at subsidized rates – remove disincentives from building in hazardous areas. People who might be reluctant to build homes along the Gulf Coast, river basins, or earthquake faults no longer have these disincentives. Governmental provision of subsidized flood insurance or emergency financial aid and rebuilding after hurricanes and earthquakes exacerbate the dis-incentives.

New Orleans is a city that should never have been built; having learned our lesson, we are rebuilding it. Consumers are rational and do not invest their own money in hazardous properties, so we use government funds instead. The increasing severity of natural catastrophes reflects the removal of dis-incentives to incur the risk of catastrophes.

STATE GUARANTEE FUNDS

State guarantee funds, which protect against insolvency of insurers, is ERM on an industry scale. Guarantee funds are hailed by regulators as a safety measure that arrived just in time. Insurance insolvencies multiplied after the advent of guarantee funds. We say that guarantee funds mitigate the pain to consumers from insurance failures. In fact, guarantee funds help fuel the insolvencies, not mitigate them.

- Before the advent of state guarantee funds, agents avoided high risk insurers, lest they be liable for procuring improper coverage and causing financial loss. An agent who issued policies from a risky insurer that failed to pay its claims might be sued by policyholders for negligence. Insurers sought to maintain strong balance sheets, lest agents not service their products. Insurance insolvencies were rare.
- Once state guarantee funds paid claims of insolvent insurers, agents sought the lowest cost carriers. Insurers had less incentive to maintain strong balance sheets. High risk insurers with little capital earned high returns, making them attractive to equityholders, and charged lower premiums, making them attractive to policyholders. Guarantee funds remove the obstacles to risky activity, ultimately harming society.¹

Illustration: Pension guarantee funds safeguard workers against investment risks, even as investment guarantee funds protect against insolvency risks. But pension guarantee funds simply shift the liability for investment losses and under-funded plans away from the party with the knowledge to manage the plans. They reduce the incentives to fully fund the plans, thereby increasing the eventual cost of plan failures. The premium for the guarantee fund does not reflect the risk, so financially distressed employers have incentives to under-fund their plans and workers have little incentive to give up current pay for adequate pension funding.

ERM AND INCENTIVES

The traditional insurance paradigm presumes that behavior is fixed and risk is exogenous. Shifting the financial consequences of risk to an insurer pools the risk, spreads the risk, and softens the pain of loss. But transferring the consequences of risk away from consumers, who have the incentive to avoid it or the ability to mitigate it, raises the incidence and costs of risk. Shifting financial responsibility has a minor effect on social welfare; raising the cost of risk has a great effect.

In competitive markets, the ultimate costs of risk are borne by consumers. By emphasizing the financial consequences but not the incentives, the traditional paradigm raises the social costs of risk. ERM focuses on the incentives to avoid risk and the ability to mitigate risk, lowering the ultimate costs to consumers.

Seat belts: People drive more carefully if they suffer the consequences of accidents. *Seat belts do not prevent accidents; they prevent injury from accidents.* They induce people to driver faster and more hazardously. People may drive so much faster that their own risk

of injury increases back to the level as without seat belts. The risk of injury to others multiplies several-fold.

Guarantee funds for insurance, banking, and pensions remove the incentives to avoid risk, under-funding, and fraud. Firms in financial distress have particular incentive to assume high-risk projects since they do not bear the cost of losses. Guarantee funds increase fraud, as managers of distressed firms have incentives to abscond with assets and leave the liabilities to the funds.

Experience rating restores the disincentives to risky activity if the manager responsible for the risk incurs the experience rating debit. When this is not true, experience rating has little effect on behavior.

Illustration: A uninsured firm eliminates work hazards that can cause employee accidents. Insurance eliminates the incentives, and plant managers are less concerned with hazards. Experience rating restores the financial disincentives to hazardous activity. In some large firms, the operations manager can best control the hazards, but the experience rating debit is incurred by the corporation.

PERFORMANCE MEASUREMENT AND MANAGER INCENTIVES

Economists, underwriters, and actuaries have long understood the effects of incentives. But the traditional solutions often erred by assuming firms were monolithic. In truth, firms are interlocking webs of managers, each with different interests. Sophisticated financial planning may shift disincentives from managers who could best *avoid* the risk to risk managers who *budget* for these risks.

Performance measurement systems exacerbate the problem. An uninsured non-systematic risk provides incentives for risk control, and it is ideal for diversified shareholders. But it is viewed as an avoidable risk and charged back to the operations manager.

Insurance premiums reduce the incentives for risk control. They are budget entries charged to the firm, not to the manager who can control the risks. Shifting the financial consequences of loss may increase the cost of loss and reduce the value of the firm, but ensure good reviews for the manager.

Illustration: Catastrophe planning is hailed as a savior when a catastrophe occurs. But catastrophe planning does not lessen the probability of catastrophes. It might even reduce the financial incentives to avoid catastrophes and move the consequences from managers best suited to control the losses to managers who are assigned to plan for risks.

- If the catastrophes are unforeseeable and uncontrollable, catastrophe planning helps.
- If catastrophe planning reduces the incentives to avoid hazardous activity, the incidence of catastrophes and their costs may increase.

MANAGEMENT COMPETENCE AND INCENTIVES

Blanket statements about risk control and behavioral incentives are rarely valid. ERM examines the behavioral incentives specific to each scenario to determine the optimal allocation of risk. ERM differs from other economic analyses by combining the theory of the firm with the theory of risk. It is not enough to assign the costs of risk to the firm responsible for them. We must assign the cost of risk to the managers most capable of reducing them and provide them the performance measurement incentives to reduce the cost to the firm.

We sometimes presume that operations managers are most competent to oversee operations and risk managers are most competent to reduce risks. But risk managers may be experts in financial risk transfer, not risk reduction. The risk manager's *raison d'être* is to control the costs of risk; his value is evident only if the risk remains but is *managed*.

The ideal solution is to eliminate the risk. The risk manager may have a poor sense of the operations contributing to the risk, no authority to change operations, and no incentive to eliminate the risk. The upshot is an increase in risk and financial loss, combined with a self-congratulatory feeling of having *managed* the risks.

ERM expands the purview of risk management to include both risk control and risk transfer, along with the effects of separation of responsibilities and performance measurement systems on risk avoidance.

LINE RESPONSIBILITIES, BUSINESS RISKS, AND MANAGERIAL INCENTIVES

As managerial responsibilities are separated, the incentives to control risk decline. Large firms separate production operations, financing, human resources, sales, advertising, labor relations, and various other responsibilities.

- Exogenous risks, such as fires and catastrophes, do not change much.
- Endogenous risks multiply, as one manager assumes risks that affects other managers.

Illustration: Employers who are both owners and managers of a firm are unlikely to promise post-retirement health care to employees. These promises help managers who seek good relations with workers but will not around when the cost come due. They hurt owners whose firm value declines when the cost of the promises becomes known.

Unfunded employee benefit obligations are a major cause of bankruptcy, just as public health care systems threaten to bankrupt entire countries. The ills caused by poor manager incentives are analogous to the ills of centrally planned systems. Job banks at General Motors are like workers at state run industries. Free markets are the antithesis of central planning; large, centralized firms with separate incentives for different managers may imitate central planning.

Government bureaucracies may supply services less efficiently than private firms. The postal services of many countries inhibit innovations that threaten their monopolies and often seek to prevent private firms from providing the services that they do not provide.

We conceive of private firms as profit-maximizing entities. But as firms grow, they take on the characteristics of bureaucracies and planned economies. Inefficient operations continue because they satisfy the interests of entrenched managers, not those of the firm.

Risk management is particularly susceptible to inefficiencies when responsibility for risk is separated from operations. ERM measures the costs and benefits of different modes of handling business decisions related to risk. Employee benefits, distribution systems, and catastrophe planning have benefits and drawbacks that are best analyzed by ERM.

RETROSPECTIVE RATING

Background: Large employers may wish to retain financial responsibility for their group health insurance plans and workers' compensation programs but have an insurer or a third party administrator (TPA) service the plans. The employer has the incentive to reduce costs, and the insurer or TPA has the expertise to service the plan efficiently. Indemnity payments are made by the insurer or TPA and reimbursed by the employer.

Loss adjustment expenses (LAE) may be handled two ways. The optimal treatment may differ for (i) investigation and legal defense of dubious claims vs (ii) overhead fees.

- A. included with losses and reimbursed by the employer.
- B. included as a flat loading that is paid by the employer.

Illustration: Suppose average loss adjustment expenses are 10% of indemnity benefits. If an employer incurs \$20 million of indemnity benefits and \$2.5 million of loss adjustment expenses, it reimburses \$22.5 million under option A and \$22 million under option B.

Employers ultimately pay for loss adjustment expenses just as for other insurance costs.²

We differentiate between the party liable for the costs, the party with the incentive to control the costs, and the party most efficient at controlling these costs.

The party paying the costs is the consumer. In the short run, we can change the party paying the costs, but the ultimate incidence of the costs falls on the consumer. Insurance changes the party with the incentives to control the costs from the consumer to the insurer.

LABOR STRIFE AND JOB SECURITY

The traditional insurance paradigm focuses on exogenous risks, like fires and accidents, for which managers' incentives are less critical. ERM expands our purview to endogenous risks, like declining demand and high labor costs, for which incentives are central.

Illustration: A firm faces greater competition and potential declining demand for its product. Its labor union wants job security and threatens labor strife otherwise. This scenario is prevalent in numerous European nations, and it has contributed to the decline of several U.S. industries (airlines, steel, autos).

The firm's response illustrates the risk management dilemma. The plant manager can promise job security, with a high risk of large loss if demand is low and no loss if demand is high. The potential loss from job security with low demand is a future loss that occurs over many years. The loss is borne not by the plant manager but by his successors and the firm's shareholders.

Labor strife causes an immediate loss that is charged back to the plant manager, who is perceived as unable to effectively manage labor relations. The mantra of many human resources (HR) departments is that smooth labor relations are critical to the firm. Poor labor relations cause dis-satisfied employees and higher production costs.

The opposite is often true: excessive costs to buy labor peace lower shareholder value and have crippled major industries. The HR department sees only half the costs and rarely quantifies them; the task of ERM is to identify and measure all the costs. By separating the risks of labor strife from the long-term costs of labor benefits, and by imposing only the risks of labor strife on the plant manager, the firm assures inefficient business decisions.

A forecast of low demand for a plant's products implies that the manager is not effective. Managers overstate the expected demand for their products to expand their responsibilities and domains. They have incentive *not* to accurately forecast demand.

The manager has incentives to under-estimate the costs of low demand and job security and over-estimate the costs of labor strife.³ The ERM solution is to (i) re-estimate the costs of job security and (ii) allocate their expected costs to the operations of the plant.

Illustration: The manager may estimate the expected cost of labor strife as \$10 million and of job security as \$4 million. The ERM specialist may re-estimate the expected costs as \$6 million for labor strife and \$8 million for job security.

- Assigning the costs of labor strife but not of job security to the plant manager creates an incentive to promise future benefits and avoid short term risks.
- Assigning the expected costs of all risks to the plant's current operations eliminates the incentive to control risk.

The task of the ERM specialist is to assign a portion of each risk to the manager, to assure proper incentives, but to allocate a portion to the firm, to assure proper business decisions. The lessons for ERM are that

1. The ERM specialist must be trusted by both managers and shareholders, so that the manager accepts the expected costs of job security and shareholders accept the expected costs of labor strife.

2. The ERM specialist must shift from financial risks to business risks. Financial analysts can quantify the risk of interest rate movements and stock price declines. The ERM specialist must quantify the risks of labor strife and competition.
3. The ERM specialist must model business risks. We often say these risks can not be modeled, when we mean that *we do not have the training for the modeling*.
4. The ERM specialist must redesign the performance measurement system and allocate costs through the firm.

COASE THEOREM: FLOWERS, FUMES, AND LOSS ADJUSTMENT EXPENSES

Economic efficiency and social welfare are distinct from legal rights. The *Coase Theorem* says that efficiency and social welfare are optimized when the responsibility of economic actors are aligned with their costs and incentives, not with their legal rights. We explain the Coase Theorem with a flowers and fumes example and then apply it to ERM.⁴

Part 1: A grocery store owns a small flower garden at the outskirts of a town near the exit of an interstate highway, where it grows flowers for occasional sale. The land is not ideal for gardening – the soil is poor and it is too far from the grocery store for the owner to tend to it – but it was the least expensive land available.

A chemical firm builds a factory near the highway exit, so that fumes from the factory do not drift into residential areas and it can easily ship raw materials and finished products. The fumes from the factory pass over the flower garden and harm the flowers, and the proprietor of the grocery store sues to have the chemical factory relocated elsewhere. The court agrees that the chemical factor is at fault for the trespassing fumes.

The present location is ideal for the factory: it is at the outskirts of the town so the fumes do not disturb residential areas and it is next to the major highway for easy transportation of goods. Moving the factory to another location is inefficient. The chemical factory would offer to buy land elsewhere and relocate the flower garden.

Whether the flower garden or the chemical factory is relocated should depend on efficiency issues, not legal merits. The court should decide who pays the moving costs and the cost of new land. Economic efficiency requires that the flower garden be relocated; the legal merits make the chemical firm responsible for the relocation costs.

Part 2: The city expands, and an apartment complex is built next to the chemical factory. The fumes from the chemical factory waft through the apartment complex, creating a foul smell, lowering demand and rental value. The owner of the apartment complex sues the chemical factory for damages caused by the fumes.

The owners of the chemical factory tell the landlord to install air fresheners to mitigate the smell. The landlord says it would be cheaper for the chemical factory to install filters on its exhaust pipes to stop the fumes. The court decides that the chemical factory was

situated on its property before the apartment complex was built, and its fumes are not in violation of any law.

It is more efficient for the chemical factory to install filters. Whether filters or air fresheners are the solution is an economic issue, not a legal one. The court should decide who must pay to install the filters; in this case, the landlord should pay to install the filters.

COASE AND RISK MANAGEMENT

ERM examines the benefits, costs, expertise, and incentives of each manager to best allocate the firm's risks. Risk transfer by traditional insurance products is rarely the optimal solution for commercial firms.

Risk transfer exchanges a large but uncertain loss for its expected value, expenses, and a profit margin. The consumer gains if the reduction in risk outweighs the cost. This is sometimes true for personal insurance, though much risk transfer is mandated to benefit third parties, not the consumer.

Illustration: Most high risk auto drivers, such as young males and inner city residents, have few assets to protect and no financial reason to buy insurance. Auto insurance is mandated to protect accident victims, not drivers.

Other insurance products are supported by tax benefits, not by consumer risk preferences.

Illustration: Permanent life insurance serves little purpose for two-income couples with one or two children, since mortality rates are low. Life insurance shelters investment income from taxes; its protection value is secondary.

For commercial consumers, the benefits of insurance is to the manager, not to the firm.

LOSS ADJUSTMENT EXPENSE

If insurers spent their own money for investigation and legal defense and were reimbursed a flat fee by employers, they might not investigate claims or to defend them adequately. The insurer has a financial incentive *not* to contest claims, since it pays the defense costs but is reimbursed for indemnity benefits. The ultimate costs to the employer rise, so employers prefer to reimburse defense costs in addition to benefits.⁵

In contrast, if the employer reimbursed claims department overhead costs, the insurer might pay high salaries and incur unnecessary expenses. It is more efficient for the insurance company to pay these costs and collect a flat fee from the employer.

Some insurance contracts mis-allocate these costs. In traditional workers' compensation retrospective rating, all loss adjustment expenses are a flat loading on losses.⁶ Similarly inefficient is the reimbursement of all loss adjustment expenses as part of the servicing carrier fee in workers' compensation involuntary market pools. The servicing carriers have

a disincentive to contest dubious claims, since they pay the investigation costs and all insurers in the state share the benefits. The disincentive to investigate involuntary market claims spurs workers of employers in the pools to file dubious claims. The higher claim costs from this unintended loss cycle justify the placement of these employers in the pools.

ERM analysis focuses on the incentives and ability to control costs. Improper risk management is as prevalent in the insurance industry as in other industries, even in fields dominated by actuaries, such as retrospective rating and involuntary markets.⁷

CATASTROPHE EXPOSURES

Catastrophe risks for property insurers are particularly suited to ERM, since they are diversifiable for shareholders but affect managers' behavior. Suppose investing in property insurance has average systematic risk, with an expected return of 12% per annum.

A monoline Homeowners insurer should return 12% to its investors. An insurer writing in Florida, Louisiana, Texas, and other Gulf Coast states faces non-systematic risks from hurricanes. It can avoid the non-systematic risk by buying a catastrophe reinsurance cover or by avoiding coastal properties.

Reinsurance is expensive. The reinsurer pays

- brokerage, underwriting, and general expenses
- double taxation and other costs of holding capital
- retrocession costs for its own risk transfer
- the management incentive costs described below.

We assume the total cost is 5% of invested capital.

For this illustration, we assume that all insurers are monoline Homeowners writers serving only in the Gulf Coast states. Pricing actuaries calculate a risk load for hurricane coverage that covers the 5% cost of reinsurance.⁸ The insurer has several options.

- The insurer may add the risk load and buy the reinsurance cat cover, earning a 12% return for its investors.
- The insurer may avoid hurricane areas and not collect the risk load or buy reinsurance, still earning a 12% return for its investors.
- The insurer may write windstorm coverage, collect the risk load, but not buy reinsurance coverage, earning a 17% return for its investors.

The investors do not want the reinsurance; they are content if the insurer takes the risk of hurricanes, earns a 17% return, and every so often goes broke.⁹ They should instruct their managers to retain the non-systematic risk. But insurers do buy cat covers, and actuaries load the premiums for the cost of reinsurance.

Apparently, shareholders are not able to instruct their managers to forego reinsurance. If managers can not buy reinsurance, they avoid catastrophe risks to protect their firms. They write business only in non-coastal territories, and they do not collect the risk load.

If shareholders want managers to assume the unique risk of hurricanes, they must pay them an incentive. Managers may agree to assume the catastrophe risk for an additional 20% of salary, which compensates them for the risk that their firms may become insoolvent. If the 20% of salary is less than the 5% of invested capital, it seems that shareholders and managers can both gain.

But shareholders are not able to monitor underwriters' behavior. Managers would collect the additional 20% of salary and still avoid coastal properties, without admitting to doing so. Managers would gain handsomely, and shareholders would lose.

The insurers buy the catastrophe reinsurance covers not to protect their shareholders but to protect their managers. Financial economics has no place for catastrophe risk loads are easily diversified by shareholders. But managers avoid these risks or eliminate them. The risk load reflects the costs of ERM, not of financial risk management.

ERM AND INVESTMENT ANALYSIS

If reinsurance were sold in perfectly efficient markets with immaterial transaction costs, managers would eliminate the diversifiable risk of natural catastrophes with reinsurance, and the returns for all insurers would be 12%.

The market for shares of insurance companies is efficient, so investment analysts ignore non-systematic risks. Insurance product markets are competitive but not perfectly efficient. Enterprise risk management examines the risks and returns for the enterprise, whether an insurer or another firm, and the effects of risk on management behavior.

ERM raises the value of the firm and its returns to investors by total risk management. If all firms equally practice ERM, returns to investors remain the same, firms become more efficient, consumers gain, and social welfare increases.

Financial analysts take several views of enterprise risk. Some deny its existence, saying that managers serve the interests of their investors. This is a normative statement, not an empirical one. In the United States, we say that managers *ought* to serve the interest of their investors. In other countries, even this norm is suspect. Managers are said to serve the interests of employees, consumers, or other stakeholders.¹⁰

In fact, managers serve their own interests, whether in the United States or other countries. Enterprise risk management analyzes the benefits, costs, and incentives that govern their behavior and affect the firm's actions. By mitigating and re-allocating risks or incentives, ERM may enhance investor returns. It is too early to predict whether ERM can do so, but it is better to err and be prepared for change than to err and be left behind.

Illustration: Oil companies have large swings in profits, caused by fluctuating demand (weather, development of third-world countries), environmental concerns that constrain other energy sources (nuclear, coal), and political issues that affect the supply of oil in the Middle East, Russia, and Latin America (wars, cartels, embargoes). Some oil company managers tend to avoid risky projects, lest they lose their jobs, and hoard cash during profitable periods and incur double taxation instead of paying higher stockholder dividends. The goal of ERM is to rationalize the assessment of risk by managers to ensure that risky projects are undertaken and cash is not hoarded. The focus is on non-systematic risk, but the major beneficiaries are the shareholders.

COMPETITION

Some financial analysts say that competition eliminates the return for non-systematic risk. If managers did not serve the interests of their investors, competition in the product markets would eliminate their firms and competition in the capital markets (takeovers) would replace them with better managers.

Competition eventually lets more efficient firms prosper and inefficient firms decay. But eventually is long, and managers are happy to prosper in a short run that lasts beyond their retirement. Sometimes entire industries protect their turf and oppose competition, erecting barriers to entry. They shift the welfare losses to consumers and governments.¹¹

Illustration: U.S. airlines vigorously fought competition since deregulation of their industry. They erected barriers to entry by denying airport access to new airlines, keeping air fares high and efficiency low. Instead of making airlines more efficient, deregulation initially made airlines more protective of their turf and more determined to suppress entrants.

The airlines might have succeeded were it not for the decline in demand from September 2001, advances in telecommunications that eliminated the need for much business travel, and the rise in oil prices in the mid 2000's. Incumbent carriers fought competition from low-cost start-up firms by monopolizing airport facilities, not by greater efficiency. Between 1980 and 2000, 29 of 30 new entrants went bankrupt; only South-West Airlines prospered. The high costs of the legacy airlines eventually forced many of them into bankruptcy, with taxpayers picking up the tab unfunded pension costs.

We differentiate between returns to investors vs the managers. Even as airlines drifted into bankruptcy with unfunded pensions, some senior managers earned high salaries and kept their post-retirement benefits. We do not judge these managers; high salaries are needed to keep competent managers in a troubled industry. But each group within the industry – executives, pilots, mechanics, managers – sought its own gains. Each group prospered; consumers and shareholders lost.

ERM examines how the risks of an enterprise, including bankruptcy risks, can be re-allocated or controlled to reduce their cost and increase the returns to investors or managers.¹²

Illustration: For twenty-five years (1980-2005), the U.S. auto industry suffered under high labor costs, inefficient work rules, and non-competitive pricing, steadily losing ground to foreign rivals. Their solution has been to strengthen oligopolistic pricing by tariffs (quotas) on foreign automakers and domestic content rules.

But passing costs onto consumers or governments aggravates competitive weakness, and U.S. auto makers never developed efficient production practices. Even as costs increased, they continued to provide high wages and post-retirement benefits. To ensure labor peace, the automakers promised benefits that they could not provide.

We do not pretend to have better management skills than the executives of the airline and automobile industries. We might have done no better when faced with the high labor costs and over-capacity in these industries. Their business successes of some executives that kept their firms intact for decades are impressive. In general, the managers of firms in these industries have prospered even as their firms floundered.

These illustrations show that competition in the product markets does not force firms to act efficiently, even in industries as fiercely competitive as airlines and automobiles. If the incentives of managers diverge from those of investors, inefficient firms may continue for decades, reducing the returns of investors. Proper ERM analysis re-aligns incentives. Our hope is that proper ERM analysis 25 years ago may have saved these industries.

REINSURANCE

Hindsight is no substitute for forward vision. It is easy to find fault with economic strategy after the fact, even as it is easy to predict an election after the people have voted or football strategy after the ball is fumbled. Hindsight gives a warm feeling, but no one pays for actuaries with good hindsight.

We use a reinsurance illustration to explain the value of enterprise risk management. The reinsurance illustration for an insurer is like an insurance illustration for a manufacturer. We explain how an integrated vision of risk, incentives, and performance measurement affects corporate strategy, and how effective ERM increases returns.

A large multiple-line insurer sells a widely diversified portfolio of insurance products. We assume that all non-systematic insurance risks, except for catastrophes, are eliminated by diversification, just as investor eliminate their non-systematic risks with diversified portfolios.

The insurer's upper management compares the costs and benefits of ceded reinsurance. We assume an average cost of 10% to 20% of the reinsurance premium, depending on the phase of the underwriting cycle. This illustration assumes a cost of 15% of the premium.

The insurer has 500 reinsurance contracts, ranging from catastrophe covers to facultative placements. Except for a few large treaties, the reinsured risks represent unique risk that are diversified (and eliminated) within the insurer's own portfolio. The insurer is larger than most of its reinsurers; it is not transferring the risks to larger enterprises.

The insurer cedes \$2 billion of premium a year, at a cost of \$300 million, including underwriting costs, brokerage, profit, and excise taxes. The insurer also pays \$400 million of premium a year, at a cost of \$60 million, for reinsurance that it deems essential, such as catastrophe covers.

A financial economist might argue that investors wish no reinsurance coverage at all, since the insurance risks are not systematic. In practice, investors may desire cat covers, since they reduce the costs of bankruptcy. An insurer that loses much of its statutory surplus and must shed other business to meet risk-based capital requirements or rating agency capital targets imposes a cost on investors, who suffer reduced returns because of regulation.

The value of cat covers to the insurer's investors is unclear. These covers are surely valuable to the insurer's senior management, since they protect the insurer's solvency and ensures the jobs and income of senior officers. We focus here on the reinsurance contracts that the insurer's senior management believes are not needed.

Financial economists often view a firm as a monolithic entity. The firm's action reflect the interests of its owners or management. In this illustration, the firm spends \$300 million a year on reinsurance that neither it owners not its management require.

The insurer's underwriters buy the reinsurance because it is in their interest to do so. Suppose an underwriter covers a \$120 million shopping mall for a 5% rate, giving a premium of \$6 million. The mall has good risk prevention and loss engineering programs, and most losses remain small. The insurer expects losses of \$3 million and expenses of \$2 million, for a \$1 million profit. Losses exceeding \$10 million would be rare.

The 16.7% return on premium may be a 25% return on capital. The policy is profitable for investors, who require a return on 12% on capital. It is similarly profitable for the firm's senior management, since even a total loss would have little effect on their jobs or bonuses.

The underwriter has authority to write up to \$10 million on a single risk. He buys a 25% quota share placement, a two line surplus share with a retained line of \$30 million, and a \$20 million excess of \$10 million excess-of-loss treaty. The net profit after all reinsurance premiums is \$250,000. The required capital is lower, and the net profit gives a 12% return on invested capital.

The underwriter is satisfied with the coverage for several reasons:

- The retained profit is small, but it is satisfactory for the retained risk.

- By ceding a good risk, the underwriter keeps the goodwill of the reinsurers and is able to place also more complex risks that have a greater likelihood of losing money.
- The insurer may allow higher limits as it gains experience with the shopping mall.

But the insurer has dissipated \$750,000 of profit. The underwriter may be satisfied, but the investors and the executives are not. To avoid this loss, we consider several proposals:

Proposal 1: Eliminate unneeded reinsurance

The executives identify the reinsurance contracts that provide the needed catastrophe cover and prohibit their underwriters from purchasing other reinsurance.

This proposal has several adverse long-term effects.

- If the underwriter offers only \$10 million of coverage, the mall buys other insurance.
- If the insurer prohibits its underwriters from using facultative placements, it must provide them underwriting authority to write the full risk.

We assume the underwriter has authority to write the full coverage. But the problem is the bonus and performance measurement systems, not the underwriting authority.

Managers do not know what bonus or performance rating they will receive. They expect

- Good results are rewarded and they raise the bar for the coming year.
- Unusually good results may be attributed to luck.
- Poor results demonstrate poor judgment.
- Very poor results are evidence of inability to run an underwriting function.

It is difficult to distinguish good underwriting judgment combined with bad luck from poor underwriting judgment. In hindsight, losses seem evidence of poor judgment.

Illustration: Suppose the insurer targets a 5% return on premium, after investment income.

- A return of 5% each year is evidence of good underwriting judgment.
- A return of 15% one year may be attributed to good luck.
- A loss of 10% one year is a sign of poor underwriting judgment.
- A loss of 20% one year signals an inability to manage an underwriting function.

The underwriter prefers a return of 5% each year to a return of 10% four years out of five and a loss of 15% the fifth year, though both give a 25% return over the five years. A manager who gets a return of 20% each year for four years and a loss of 50% the fifth year is viewed as an unsteady performer, whose high returns some years are attributed to luck and whose one poor return shows poor judgment. The 30% overall return surpasses the 25% in the other scenarios, but the overall benefits (in bonus and promotions) are lower.

It is said that reinsurance lets the insurer sleep at night. To reword this, reinsurance lets the underwriter sleep at night. The insurer's owners (its investors) are concerned with stock prices, not with book earnings. High expected returns raise the stock price; a large, non-recurring loss has less effect on reducing the stock price.

Underwriters give up high expected returns with high variability in favor of steady returns that meet performance expectations, even if they are lower. The means to accomplish this is reinsurance, even if it is expensive and is not in the interests of shareholders.

Proposal 2: Change the management bonus plan

It appears that the bonus plan and performance measurement system over-emphasize stability. The insurer must ensure that performance is measured by long-term results, not by year-to-year stability.

This is impossible to achieve, for several reasons.

If the underwriter knew that four years of +20% profit precede a 50% loss, the combination might be acceptable. One could (perhaps) budget for the loss year by saving the excess profits of the good years. But the loss may come before the good years. If the first year has a 50% loss, an underwriter would not gamble on a second loss the next year.

Perceptions force an emphasis on stability. Each manager's performance is compared with that of other managers. Suppose other underwriters achieves returns of 5%.

- A steady 6% return is outstanding performance.
- A return of 20% each year for four years and a loss of 50% the fifth year shows an undependable underwriter. Good years bring envy and bad years bring rebuke.

Managers gear their performance to their expected bonuses, not the desires of executives. In contrast, investors want managers to take non-systematic risks that raise their returns.

Investors do not set performance measurement goals for middle managers. They may set targets for the insurer as performance backed compensation for the CEO. But these have little effect on the insurer's purchase of its reinsurance contracts:

- The CEO agrees that the insurer buys too much reinsurance and reduces its expected return. The issue is how to prevent this. The CEO's compensation is raised by risky but profitable underwriting.
- The chief underwriting officer may not buy facultative reinsurance because he is judged on the insurer's overall underwriting results, which are smoothed over the large book of business. The facultative placements reduce the average results; only the major corporate treaties (catastrophe covers) are needed for the exceptionally bad years. But the middle managers – heads of line underwriting divisions – need the reinsurance to protect their performance.

We have treated investors and the insurer's executives as though they are not concerned with specific risk. But even investors seek explanations and scapegoats for bad performance. A bad underwriting year is attributed to poor judgment by one underwriter who wrote a policy with a \$60 million loss, even though the expected profit was \$10 million and the risk was not systematic.

Many insurers use internal reinsurance to spread exceptional losses from individual divisions to a corporate group. Internal reinsurance can work well, but it is difficult to implement.

Proposal 3: Accounting Reinsurance

The simplest internal reinsurance is a pure accounting process. Each underwriting division is assigned a retention. Losses above the retention are paid by a corporate fund. The losses of the corporate fund are reimbursed by each underwriting division as a percentage of cover above its retention.

In our illustration, the retention for commercial property risks may be \$10 million. The underwriter accepts the full \$120 million risk, but losses above \$10 million are assigned to a corporate fund. At the end of the year, the total losses above the retention are allocated to the underwriting units.

This internal reinsurance creates more problems than it solves. Underwriting high layers of loss requires expertise, and accounting reinsurance removes the incentive to collect enough premium from policyholders. An underwriter who needs a higher policy limit to retain an account but who does not pay for the higher losses is unlikely to charge enough.

Proposal 4: Underwritten Reinsurance

The insurer generally has expertise in pricing high layers of loss. It may have its own assumed reinsurance department, or it may have an umbrella liability unit. Experienced home office underwriters may set internal reinsurance rates for each property. These reinsurance premiums and the associated reinsurance recoverables are notional (accounting) entries, not actual cash flows. They affect the bonuses and performance ratings of line underwriters, but they avoid the commissions, brokerage fees, expenses, and profits of outside reinsurers.

This method is superior to the other proposals, but it still has drawbacks. In particular, it may cause discord among underwriters. Suppose a branch underwriter (BU) writes the ground-up policy, and a home office underwriter (HU) sets the reinsurance premium.

- If the home office underwriter is not responsible for the reinsured losses, the branch underwriters will seek low reinsurance rates. Understating the premium has no cost for the home office underwriter but raises the profit that affects the branch underwriter's bonus and performance evaluation.

- A home office underwriter who is responsible for the reinsured losses will set high reinsurance rates, particularly if the branch underwriter must take the reinsurance.

Some insurers make the internal reinsurance optional. The branch underwriter can take either the internal reinsurance or outside reinsurance. This still creates discord if some branch underwriters feel that are not receiving equitable rates. Outside reinsurers are unlikely to bid on the business, since they write the cover only if the primary insurer believes their premium is too low.

Understating the premium has no cost for the home office underwriter but raises the profit that affects the branch underwriter's bonus and performance evaluation.

THE TRADITIONAL PARADIGM: RISK TRANSFER AND POOLING

In the traditional insurance paradigm, the actuary uses insurance products to re-allocate risks between consumers and insurers. By pooling homogeneous, independent exposures, insurance is presumed to diversify the risk and increase social welfare.

We speak of risk pooling, the law of large numbers, and the credibility of homogeneous risk classes. We say that a thousand consumers with a single exposure each has high risk. An insurer with a thousand homogeneous exposures has low risk.¹³

Illustration: A firm with annual income of \$500 million and commercial auto exposures of \$5 million a year transfers the risk to an insurer with annual income of \$500 million and commercial auto exposures of \$500 million a year. We say that the commercial automobile risk has been pooled with similar exposures and reduced by a factor of $\sqrt{100} = 10$.

The opposite is true. The \$5 million of auto exposures are independent of the other risks of the firm. The auto exposure is a unique risk, which is eliminated by diversification in the original firm. By pooling the risk with similar exposures, the insurer diversifies the process risk but not the parameter risk among these exposures.

A single driver faces a large risk exposure, since a single auto accident may cost several hundred thousand dollars. If 100 drivers transferred their exposures *to a single individual*, that person has $\sqrt{100} = 10$ times the standard deviation of loss and 10 times the risk, assuming all accidents are independent. Since the risks are not completely independent, the combined risk is 15 or 20 times the individual risk. If the risk is 10% parameter risk and 90% process risk, the pooled risk is $10\% \times 100 + 90\% \times 10 = 19$ times as great.

RISK SPREADING

Spreading (diversification) reduces risk; pooling increases risk. Pooling of homogeneous risks is needed for pricing, not for risk reduction.

An insurer with 1,000 homogeneous risk can estimate the expected losses and derive the proper premium. If the risks are heterogeneous, the average cost is too high for some and too low for others. To avoid adverse selection, the insurer may not accept risks unless it can find enough homogeneous exposures to *price* the coverage accurately.

Once the insurer has priced the risk, it spreads the risks to diversify and eliminate it. The insurer is a corporation of perhaps 10,000 shareholders, not a single individual. Each risk transferred from the individual driver to the insurer is spread over 10,000 persons. A loss of \$100,000 to the driver is a loss of \$10 to the shareholder. The risk is diversified among the other assets of the shareholder and is eliminated.

If the insured is also a corporation of 10,000 shareholders, the transfer of financial loss to the insurer does not reduce risk. But the transfer of financial loss affects social welfare by changing incentives.

BENEFITS AND COSTS OF INSURANCE

ERM examines the benefits and costs of risk management.

For some personal consumers, insurance provides positive net present value stemming from their small size relative to potential losses. For others, insurance is required or encouraged by statute to help others, not the consumer. For instance:

- Auto insurance is supported by financial responsibility and compulsory insurance laws to help accident victims. A young unmarried male driver with no appreciable assets has no financial reason to spend several thousand dollars on insurance. A compulsory insurance law helps the victims of his hazardous driving.
- Life insurance is supported by federal income tax law to help widows and orphans.
- Workers' compensation is required to aid injured workers, not their employers.

For corporations, insurance has dubious value for investors. ERM has the following steps:

- Identify the benefits and costs of insurance and other risk management techniques.
- If the firm buys insurance, the buyer gains. The buyer is the manager who buys the insurance, not the investors in the firm.
- The manager is not buying insurance from ignorance. It is not as though the manager would forego the insurance if he or she were aware that the investor does not need the insurance. Rather, the manager buys insurance to protect his own interests. If the firm's owners or executives prohibit the purchase of insurance, the manager may forego the business activity, creating a loss for the firm.

Insurance increases social welfare two ways:

- by spreading the risk over a large number of shareholders
- by removing the dis-incentives to avoid beneficial economic activity

An individual buys a personal auto policy to spread the risk among the shareholders of the insurer (or the policyholders of a mutual insurance company). The cost of insurance is offset by the reduction by spreading the risk. For a corporate consumer, if not for agent principal problems, auto insurance has a negative net present value for the firm and a positive net present value for the manager. For the investor, the present value of the premium is about twice the present value of the losses, since the risk is diversifiable. But the auto driver or the manager of the business unit needs insurance:

- The driver of a delivery truck fears an accident will incur his manager's indignation.

- The manager does not have a budget for accidents. A \$100,000 accident imperils his bonus. The auto insurance premium is a hidden cost; it is part of the budget over which he has no control and on which he is not judged.

Auto insurance is a budgeted cost like home office rent; the manager is not judged on the cost of insurance, unless it results from poor risk control. But an uninsured accident the manager's fault: hiring an irresponsible driver or failing to maintain proper vehicle safety.

To see the benefit of insurance for the firm, suppose the firm's investors prohibit managers from buying insurance because it has a negative net present value for them. They intend for the firm to cover losses from its assets, saving about half the premium, and they expect managers to become more careful about hiring drivers and monitoring vehicle safety.

But managers seek to maintain their own jobs, bonuses, and performance ratings. A manager who can not buy insurance may out-source the job, hiring another firm to deliver packages. The firm loses more by hiring another distributor than by buying commercial insurance. But the manager gains in job security.

Insurance reduces social welfare two ways:

- by imposing additional costs of risk
- by weakening incentives to reduce risk

The initial costs of risk are the harm to accident victims. Insurance imposes costs of risk transfer and increases the harm to accident victims. The best risk management, which is done by some insurers, minimizes the risk transfer costs and increases safety incentives.

About 40% of the insurance premium is spent on acquisition, underwriting, and other expenses, including the return on capital, federal income taxes, and state premium taxes. For workers' compensation, federal income taxes, state premium taxes and assessments, and fees are about 10% of the premium.

Another 10% of the premium is lost on higher morale and moral hazards. Consumers with insurance are less careful about safeguarding their property against loss and more likely to exaggerate claims, leading to wasteful litigation.

Underwriting risk is not systematic risk. The capitalization rate for insured losses should not be adjusted for risk, so losses are about 50% of the premium. It would seem that buying insurance harms shareholders, by increasing their costs and reducing incentives to avoid risk.

Suppose a firm hires drivers for its delivery trucks. If the firm has no insurance, it would hire only adult drivers, carefully monitor drivers for poor safety habits, and keep its vehicles in good working condition. With insurance, the firm hires young males drivers and is less careful about safety. Buying insurance weakens the manager's incentive to hire only responsible drivers and to ensure proper vehicle safety.

RISK TRANSFER VS COASE THEOREM

Insurers and economists differ on the optimal allocation of risk.

- *Insurers*: Risk should reside with the party that is least risk averse or best able to diversify the risk.
- *Economists (Coase theorem)*: Risk should reside with the party most able to reduce it.

Enterprise risk management is a paradigm shift that focuses on managerial incentives to maintain business performance and risk reduction to minimize the cost of risk.

The property owner can better protect a building against fire or windstorm than the insurer. Insurers often say they are knowledgeable about loss engineering and reduce hazards. There is truth to this, particularly for workers' compensation insurers with much expertise. But underwriters and agents focus on profitable sales. They incur their own expenses plus additional friction costs, such as taxes and returns to investors. Loss engineering occurs, but it is a minor component of their work.

In the enterprise risk management paradigm, the actuary works with performance metrics to re-allocate risk among business units and managers. The enterprise risk is reduced, shifted, or insured (if necessary). Most risk remains with the property or exposure, so that incentives to reduce loss are strong.

Upshot:

We seem to have come full circle. Auto accidents are not systematic risk, so investors prefer that firms retain the risk, saving on insurance expenses, avoiding morale risk, and keeping incentives to hire responsible drivers and maintain vehicle safety. Managers are measured by performance, and auto accidents reduce their bonuses or advancement. If managers can not buy insurance, they out-source the job, which is more expensive (wasteful) than the insurance. Changing the performance measurement system is easy to say but difficult to do, since supervisors correctly see auto accidents as a cause of poor income and a possible sign of poor management.

We would like to retain the risk but have it shifted to a corporate account. But if we maintain the incentives to avoid loss, the costs must be shifted back to the manager.

The actuary plays the pivotal role. The loss costs, which depends primarily on fluctuations in loss severity, are shifted to a corporate account, relieving the individual manager from buying insurance or out-sourcing the job. The cost of risk that is shifted back to the manager is the predictors of loss, not the loss itself. By focusing on the predictors of loss, the manager (who is best able to minimize the loss) has a leverage incentive to reduce the cost of risk.

The actuary bases the cost of risk on the classes and experience of the manager. Suppose FedEx seeks insurance for its drivers, vehicles, airplanes. A commercial auto

policy would be experience rated. The firm retains the overall losses, but charges each unit by driver characteristics, vehicle safety, and accident record. The accident record is based on claim frequency, not claim severity. The firm would allow managers to opt for greater experience rating, encouraging them to adopt better safety procedures. The costs of the coverage to the manager would be included as controllable costs.

The actuary setting up the internal insurance system must have the respect of the managers, who defer to his cost allocation.

Illustration: A manager has ten delivery trucks and twelve drivers. All actual losses are covered by the internal corporate fund. This saves the expense costs and profit of the insurer.

The cost allocated back to the manager depends on the characteristics of the drivers and of the trucks. This maintains the incentives to reduce risk.

Each year, the allocated costs are adjusted by experience rating, whereby higher claim frequency increases the allocation. To encourage managers to adopt better cost control, managers may opt for higher leverage in the experience rating plan. For instance, an auto accident may normally be given a cost allocation of \$2,000. The manager may opt for a cost allocation of \$5,000 and an offsetting reduction in other cost allocation.

The firm may opt for a more highly leveraged experience rating plan for all its managers. Suppose that the manager expects each year 2 accidents and \$30,000 of losses each year. Most losses are random, and an experience rating plan would assign \$2,000 to each accident and \$26,000 in other allocated costs. The more leveraged plan would assign \$15,000 to each accident and zero in other allocated costs.

The manager pays the same costs in the long run. But the manager now has greater incentive to avoid accidents, which can often be prevented by inexpensive safety controls. Reducing the number of accidents is the most efficient way to minimize the cost of accidents, since claim frequency is an excellent predictor of total loss costs.

Too leveraged a plan provides incentives to out-source the job. If the plan assigned \$50,000 to each accident, and the manager could not control most accidents, the manager might out-source the package delivery function; otherwise a few accidents would eliminate the manager's bonus. But if the plan assigns \$10,000 to each accident, the costs even in an adverse scenario would be less than the cost of out-sourcing.

For a commercial experience rating plan, this does not work. If the assigned cost is greater than the predictive value, a manager with a debit modification seeks coverage elsewhere. This is because the experience rating plan is for next year's premium. But the internal program assigns the cost for the past year's program, so there is no incentive to change one's activities because one year's costs are high.

THE RISK SPECIALIST VS THE AGENT/UNDERWRITER

For personal coverages required by statute, such as auto insurance, insurance products remain the optimal means of risk management. For corporate consumers, traditional insurance products may be wasteful. ERM services are doubly useful for the consumer: they shift the financial loss from the manager to the corporation but leave the manager with the incentives to reduce losses.

Insurers that adapt to both insurance and ERM paradigms will be most successful. A large corporation may transfer financial risk to a subsidiary, so that it keeps incentives to reduce risk and avoids the disincentives of uninsured losses. It seeks an insurer with ERM expertise; it does not need traditional insurance products. The commercial lines agent or underwriter who focuses on sales becomes superfluous; the ERM specialist who focuses on the manager incentives that prevent optimal handling of risk becomes essential.

RISKS VS INSURANCE PRODUCTS

The airline and automobile industries show the disparity between the risks facing large firms and the insurance products available. Insurance products are best for independent and exogenous risks, such as workers' compensation, liability, and property exposures. Losses of even \$2 or \$3 million are diversifiable for the firm; smaller claims are best handled by non-insurance risk management techniques.

The two industries failed because of risks that insurers and other financial intermediaries do not cover. Managers and consultants identify problems that they can solve without changing business strategy. The goal of enterprise risk management is to identify problems that call for changes in business strategy.

The most common cause of business failure is a reluctance to abandon failed strategies. The auto industry shows this most clearly. High gas using vehicles lose consumer demand when oil prices rise. The auto industry has known this for decades, but managers producing high gas using vehicles are no interest in abandoning their projects. But oil is not eternal, and it is quickly running out. The price of oil fluctuates from year to year, but the denouement is the same: vehicles which use less gas will ultimately do better.

The role of the risk manager is a mix of the easy and difficult. The easy part is to trace the future scenarios that affect the firm. The increasing demand, diminishing supply, and rising price of oil is not debated. The exact figures depend on economic growth in the emerging countries and reserves still buried underground, but the end is the same.

The implication for the auto industry is that vehicles that consume less gas will be more successful. We don't need actuaries trained in ERM to relay this message to the auto executive.

The second cause of the auto industry's demise is the high labor costs, both for union contracts and post-retirement benefits.

The task of ERM is to identify why managers do not adapt and how their incentives can be modified. Managers tend to avoid conflict and short term losses.

Attempts to wall themselves off from foreign competition either failed legislatively or produced perverse results. Faced with domestic-content laws, Japanese and European firms built large plants in the U.S. with nonunion work forces. That has left the Big Three and their spinoffs, like Delphi, with redundant work forces and huge legacy costs in the form of generous pensions and open-ended retiree health benefits.

Union-driven legacy costs have already forced many steel companies and airlines into bankruptcy, with pension obligations fobbed off on the Pension Benefit Guaranty Corp. The Big Three auto companies might as well do the same. At least there aren't that many big unionized private industries left to fall. Besides, taxpayers and politicians angry at costs imposed by unions--particularly in the public sector--can always change the rules and reduce unions' bargaining leverage. Just as the economic marketplace eventually reduced the power of the old industrial unions, the political marketplace could, in time, reduce the power of the "post-industrial" unions.

The attempt to protect workers from all risk has turned out to be very risky indeed, since in a dynamic economy large corporations are subject to competition from firms with lower costs. In the auto industry the result is significant pain for those who relied on the Big Three and the UAW; but the result is also a vastly faster growing economy and many more opportunities than provided by the European welfare states.

DISTRIBUTION SYSTEMS

The actuary's task is to identify significant risks to the consumer. The traditional insurance paradigm focuses on external (exogenous) risks: large workers' compensation accidents, products liability, large property damage from earthquakes and hurricanes, unforeseen hazards like asbestos and pollution. Firms need protection from these risks, but these exposures are becoming less common and risk transfer methods are becoming more efficient.

The focus for ERM changes from financial risk transfer to performance measurement systems: from the traditional benefits of insurance products to the needs of the consumer. ERM is not restricted to insurance transactions, and many financial professionals are competent. The ERM specialist changes the incentive systems of the firm:

We measure the long range costs of risk and the benefits of mitigating risks. Re-aligning a performance measurement system is expensive. Many managers prefer to rule by fiat instead of by inducement.

to re-allocate the costs to the appropriate corporate budget while keeping the risk-reduction efforts under the managers best suited for them. The actuary is ideally suited to serving the consumer's needs.

Insurers and actuaries adapt as the environment changes. An actuary who does not anticipate a consumer's needs must meet them anyway when traditional products are rejected. But adaptation is insufficient in a fiercely competitive over-capitalized industry.

Risks that may lead to business failure or to material changes in the firm's operations are most significant. These risks are of two types.

Traditional insurance risks are exogenous and large (sometimes catastrophic) risks. Even the largest firms need coverage for

We focus here on risks to the firm caused by perverse incentives. As market become increasingly competitive, and as managers are evaluated by performance, mis-aligned incentives are common.

We have dealt above with managers avoiding risks that shareholders would assume, reducing the profitability of the firm. The task of the ERM specialist is to change managers' incentives so that these risks are assumed and controlled, not transferred.

We deal now with the opposite risks. Some risks threaten the firm but are assumed by managers to avoid short term costs.

Inefficient distribution is the bane of manufacturers in many industries. We see the effects for insurers, where the short term costs prevent managers from incurring the costs of reform. The same trade-offs and self-interest of managers occurs in other industries.

The independent agency system is inefficient, but it prevents insurers from incurring the short run costs of reform. If insurance managers are measured on production and sales goals, they buy peace by working through existing agents. Agents can be added incrementally, raising managers' production even though the long-term effects are detrimental to the insurer.

Illustration: An insurer sells personal lines coverages through 400 independent agents who have worked with the firm for decades. The distribution system is inefficient, adding about five points to the combined ratio. But the insurer's managers do not risk their careers on seeking reform, which imperils their current books of business. The good manager focuses on the current business strategy, strengthening the current agency relations to eliminate duplicative efforts and streamline processing. The manager is rewarded for the short term gains, but the insurer's long-term profits are reduced.

Outsiders presume that inefficient distributors do not persist in a competitive industry. The distributor would prefer to join the manufacturer to ensure long-term success. But the distributor's horizon does not extend past retirement, and profits are based on current sales.

The agent receives a commission on each policy. Consumers tend not to switch insurers, and the agent's renewal book of business decreases slowly, if at all. A 50 year old agent loses independence and the security of owning the renewals on several hundred policies by becoming an exclusive agent. Promises of financial security by an insurer are no stronger than the insurance manager's current intentions, subject to change of managers and periodic revision of the insurer's goals. Giving up an independent agency means abandoning a strong fellowship of agents.

Continuing agency relations serves the immediate goals of both agents and managers. The insurer's dilemma is not that change is impossible, though it is hard. Its dilemma is that its managers have incentives to strengthen the current system, not to reform it. Executives who want change must battle their own managers.

Executives win overt battles and lose covert ones. An executive who demands a change in the distribution system receives the passive acquiescence of his staff and their covert refusal to promote the change. Managers follow the dictates of their own rewards. The executive may demand that all new agency contracts be for exclusive agents, but managers are still measured by annual premium. The manager focuses efforts on retaining existing agency contracts, even if they are not profitable, and adds new agents only if they do not threaten existing relations.

An insurer may conclude that it has tried to change distribution systems but has failed. Most often, it has tried by fiat and been defeated by its own performance measurement

system. An executive correctly perceives that the insurer gains from an exclusive agency system but fails to induce managers to achieve this goal.

Changing distribution systems is risky. The ERM perspective acknowledges the risk. The long-term strategy is not disputed. Fleshing out the strategy is counter-productive if managers' incentives remain with traditional production goals.

The goal of ERM is to identify the cost to managers of switching and to change the performance measurement system that enforces these costs. This often proves difficult, because the managers responsible for performance measurement are those who have succeeded under the old strategy.

Auto manufacturers sell through car dealers, who take a middleman's fee. Now consumers compare auto models on the internet, and the car dealer has become a distribution cost instead of a benefit. Switching distribution systems is perilous as replacing independent agents by exclusive ones. A manager who is measured by annual production prefers to work through the existing system, even at the long-run cost to the firm.

Soft-drink manufacturers work through bottlers, who sell to retail outlets, incurring extra distribution costs. As retailers better manage their inventory, middlemen become inefficient costs.

to avoid losing business. In some lines, the changes are already occurring, and insurers who adapt to them are best positioned to succeed.

Illustration: In the 1980's, workers' compensation was a first dollar coverage. Large employers enjoyed experience rating and retrospective rating plans which gave more credibility to their own experience, but acquisition, underwriting, and general expenses were based on first dollar premiums. By the late 1980's, the traditional perspective was changing.

Large residual market placed high costs on first dollar coverage. An employer with a \$2 million premium might be paying \$500,000 for expenses and \$200,000 for the residual market.

The gradual spread of competition in the workers' compensation market made employers more aware of alternative insurance products.

The rising costs of workers' compensation seemed incongruous with declining accident frequencies, leading employers to focus more on accident prevention than financial risk transfer.

Automation, worker training, loss engineering, and speedy rehabilitation of disabled workers reduce workers' compensation costs, particularly when combined with excess coverage or large dollar deductible policies. Knowledge of the potential costs and methods of controlling them is essential.

Other exposures require equal risk expertise, and can also be mitigated. Most large firms have property, automobile, and general liability exposures. In the traditional paradigm, the firm's financial officer or risk manager seeks insurance products to transfer these risks. The financial officer can identify the risk covered by the insurance products, but may not be qualified to price them or to fit them into the general risk structure of the firm. He or she may not understand how to change managers' incentives from elimination of these financial risks by insurance transactions to re-alignment of the risks based on manager incentives.

¹ Economists advocate risk-based guarantee fund premiums, though these have proved impractical.

² The ultimate incidence of insurance costs falls on workers, who receive less in wages to compensate for the benefits. These plans often have a negative value for workers; their prevalence reflects:

- Tax advantages that favor employer provided health insurance.
- State statutes that mandate workers' compensation coverage.
- Benefits provided by managers seeking labor peace over long-term costs to the workers.

³ Psychologists speak of this as cognitive dissonance: managers with incentives to avoid labor strife will over-estimate the probability and cost of labor strife and under-estimate the probability of falling demand.

⁴ See R. Coase (1988) *The Firm, the Market, and the Law*. The Coase Theorem assumes an efficient market with no transaction costs, such as the costs of performance measurement systems.

⁵ This argument should not be taken to extremes. Even if the insurer paid the ALAE costs, it would not pay claims indiscriminately, lest the employer choose a less expensive carrier at renewal.

⁶ Workers' compensation is considered a no-fault coverage; the ALAE was once a minor expense on rare claims. For the liability lines of business (general liability, employer's liability, private passenger automobile, commercial automobile, products liability, and medical malpractice), ALAE is included with losses both for class ratemaking and for experience rating.

⁷ The Americans with Disability Act (ADA) is another oft-cited illustration of legislative mismanagement of risk that have increased costs to citizens and decreased social welfare.

⁸ Some actuaries speak of risk loads in terms of equity among insureds: consumers receive greater risk transfer benefits from hurricane coverage and should pay more. But equity is a subjective concept that has no relation to prices in a competitive market. Some actuaries relate risk loads to the variance of returns. But financial economists say that non-systematic variance has no effect on expected returns. The risk load depends on the product market. If all insurers buy cat covers, the 5% of capital cost becomes part of the cost of coverage, no less than other loss or expense costs. If most insurers are large multi-line insurers with little hurricane exposure, the product market does not allow an additional charge for a monoline insurer. For simplicity, we assume all insurers are identical monoline Homeowners writers.

⁹ If the costs of bankruptcy were high, risk loads might be needed. But the costs of bankruptcy are low for insurers, whose assets are easily sold and do not lose value in bankruptcy. Investment analysis has no catastrophe risk load, just as it has no load for other non-systematic risks, like labor strife or terror attacks.

¹⁰ ERM proponents sometimes use the same terms, speaking of stakeholders in the firm. Actuaries should avoid ill-defined terms, and specify the incentives, benefits, and costs that affect managers' behavior.

¹¹ We often quote Adam Smith about the benefits of competitive markets, forgetting his warning that firms continually seek to suppress competition.

¹² ERM is more socially beneficial than classic investment risk theory. Shareholders may maximize value even if consumers or employees lose.

¹³ Risk pooling, the law of large numbers, and the credibility of homogeneous risk classes are on the CPCU and actuarial exam syllabi, in both the mistaken and correct formats explained in the text of this paper.