

Risk management



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Risk management

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2010 SECTION LEADERSHIP

Newsletter Editor

Ross Bowen
e: Ross.Bowen@allianzlife.com

Assistant Editors

Steven Craighead
e: steven.craighead@towerswatson.com

Mohammed Ashab
e: mohammed.ashab@signal-ctc.com

Saskia Goedhart
e: SGoedhart@munichre.ca

Ashley Goorachurn
e: ashley.goorachurn@sunlife.com

Officers

Matthew P. Clark, FSA, MAAA, Chairperson
A. David Cummings, FCAS, MAAA, Vice-Chairperson
Jason Alleyne, FSA, FCIA, FIA, Treasurer

Council Members

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Barbara Snyder, FSA, FCA, MAAA
Michael P. Stramaglia, FSA, FCIA
Judy Ying Shuen Wong, FSA, MAAA
Frank Zhang, FSA, MAAA

SOA Staff

Kathryn Baker, Staff Editor
e: kbaker@soa.org

Robert Wolf, Staff Partner
e: rwolf@soa.org

Sue Martz, Project Support Specialist
e: smartz@soa.org

Julissa Sweeney, Graphic Designer
e: jsweeney@soa.org

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ARTICLES NEEDED FOR RISK MANAGEMENT

Your help and participation is needed and welcomed. All articles will include a byline to give you full credit for your effort. If you would like to submit an article, please contact Ross Bowen, editor, at Ross.Bowen@allianzlife.com

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In order to efficiently handle articles, please use the following format when submitting articles:

- Word document
- Article length 500-2,000 words
- Author photo (quality must be 300 DPI)
- Name, title, company, city, state and email
- One pull quote (sentence/fragment) for every 500 words
- Times New Roman, 10-point
- Original PowerPoint or Excel files for complex exhibits

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Please send an electronic copy of the article to:

Ross Bowen, FSA, MAAA

Allianz Life Insurance Co of North America
ph: 763.765.7186
e: Ross.Bowen@allianzlife.com

Letter from the Editor

By Ross Bowen

WELCOME TO THE SEPTEMBER ISSUE OF RISK MANAGEMENT!

We have a number of interesting articles for you.

Amit Ayer has contributed the article, “Risk Appetite for Variable Annuity Writers.” Companies need to learn to balance competing objectives—reducing GAAP earnings volatility, controlling required statutory capital and reserves, and maintaining economic profitability—the “three-headed monster” challenging variable annuity writers.

Stephen Heimstra follows up his well received article in our last newsletter with “Responding to Systemic Risk.” He makes the analogy that financial deregulation has forced formerly separated business to compete in the same field of play. Because businesses are increasingly international, regulators are dealing with an open-ended system, sharing oversight with overseas regulators. No one regulator is completely in charge and this open system can create instabilities.

We also have a timely article on financial regulation. The financial reform bill just passed, and Max Rudolph has ideas on how it should be implemented. Sometimes unexpected consequences can emerge from a new regulatory environment, and Max’s article gives us some things to watch for as the new rules take effect.

We’ve found an interesting blogger in Steve Steinberg. Although not an actuary, he’s written an interesting article on risk compensation—where improved safety features actually leads to an increase in risk taking, known as risk compensation or risk homeostasis.

Stuart Silverman has written an article on economic capital from a unique perspective. It is accepted practice these days to reflect asset volatility in our stochastic models, but we do not usually model volatility associated with our many liability assumptions. To introduce this idea he uses as a case study a block of SPIAs, for which the mortality cannot be known for certain.



Ross Bowen, FSA, CFA, MAAA, is vice president, profitability management at Allianz Life Insurance Co. of North America in Minneapolis, Minn. He can be reached at Ross.Bowen@allianzlife.com.

Dave Ingram and Alice Underwood present their thoughts on risk management in “Rational Adaptability.” They believe there are four general risk perspectives: profit maximization, conservation, risk reward and pragmatism. The current ERM paradigm is a risk-reward approach, which means it might not align with managers with different viewpoints. They recommend that companies be agile enough to modify their risk management practices as the external environment changes.

Enjoy this issue! Thanks to all the contributors! ■

Looking Forward – Applying Risk Management to the Future

By A. David Cummings

THIS IS MY FIRST OPPORTUNITY TO WRITE AN ARTICLE FOR THE "CHAIRPERSON'S CORNER."

Thanks to Matt Clark for his leadership over the past year, and to the many people who have helped establish our profession's reputation for expertise in risk management.

I'm looking forward to the next year of serving as chairperson of the Joint Risk Management Section (JRMS). As I think about the contributions that our profession is making in the field of risk management, I am glad to see that so many actuaries are also looking forward. We are helping to make sure that the lessons of the past are applied to improve risk management in the future. Two years ago, as I began my service on the JRMS Council, the world was waking up to the reality of a full-blown global economic crisis. This event has given

us nearly unlimited opportunities to analyze the failures that led to our current reality.

We all recognize that "post mortem analysis" of major risk events is crucial to

improving risk management practices. The JRMS has played a significant role in giving many people a forum to provide their views of what went wrong. Our first "call for essays" in 2008 attracted more than 40 authors. They shared a variety of perspectives on the various issues that ultimately led to an aggregation of risk across the entire financial system. When we published these essays on our website, they attracted the attention of many people who were looking to make sense of what had happened. Even today, these essays still get many hits on our website.

This newsletter has also been an important forum for ideas and insights related to the economic crisis. We have had many contributors who have provided deeper insights and challenged us to learn from the lessons of the past. The JRMS Research Team has also commissioned important and timely studies that provide a deeper body of literature on root causes of the crisis.

Our ERM Symposium has been a premier showcase for leading thought on all of these issues.

With so much happening, there seems like the "post mortem analysis" could continue for years to come. At a time like this, it would be very easy to get stuck looking backward. But in order for our profession to truly shape the risk management practices of the future, we need to look forward. The landscape of risk management has already changed significantly. We need to actively apply the lessons of the past while grappling with the risks of the future.

The JRMS is again providing a vital forum for the future of risk management to take shape. We recently issued our second "call for essays." These essays are focused on the challenges of managing systemic risk and the new (or soon-to-be new) realities of financial regulatory changes. They will be certain to seed the thinking about how our profession can benefit the broader financial services industry.

We also sponsored a unique collaborative workshop in May, in conjunction with the Enterprise Risk Management Institute International (ERM-II). This workshop brought risk management practitioners together with regulators and academics to frame a dialog about the future of financial regulation.

So as I begin my term as the JRMS Chairperson, I'm looking forward—along with all of you. We have made significant contributions to the future of risk management, but there are many more to come. The Joint Risk Management Section will continue to provide opportunities for actuaries to help define the best practices of the future. I encourage you to take advantage of these opportunities and make your own contribution as ERM evolves toward the future. ■



A. David Cummings, FCAS, MAAA, is vice president and chief actuary at ISO Innovative Analytics in Bloomington, Ill. He can be reached at david.cummings@iso.com.

Artificial Intelligence and Autonomous Automobiles

By Steve G. Steinberg

THERE IS A SENSE OF EXCITEMENT THAT INFECTS EVERYONE, whether Detroit exec or Silicon Valley VC, who is involved with electric cars. It comes from the belief, propagated by an enthralled media, that what they are doing is important—even vital. Electric vehicles, they insist, are revolutionary.

They are delusional.

Whether a car runs on gas, electricity, or steam, it remains a deadly weapon, with victims denominated not just in bodies, but in wasted wages and lost time. No matter what your attitude toward suburban and urban sprawl (personally, I'm a fan) anyone who has tried driving the I405 at rush hour knows that cars need far more than a new motor.

But, fortuitously, the hype over the electrical car is providing covering fire for a true revolution: the *computational* car. It is the increasingly autonomous intelligence of automobiles, far more than a new drive train, that stands to alter fundamentally how we interact with cars, and how they affect our planet.

Already, more than a dozen 2010 car-year models offer intelligent safety features such as lane departure warning and adaptive cruise control. Crucially, they do not just flash a light or sound a buzzer when a problem is detected: they *autonomously* apply the brakes or adjust the steering. The driver is no longer the fail-safe that ensures the machine is running correctly. The driver is a problem to work around. The driver, you might say, is a bug.

Of course, I am far from the first to recognize the importance of this development. Even *Wards*, the automotive trade weekly, recently acknowledged that artificial intelligence is poised to change cars more thoroughly than electric propulsion ever will. And Brad Templeton, a well-known net entrepreneur, has written extensively and persuasively on how today's intelligent safety features will inexorably lead to autonomous vehicles.

Making this technology all the more notable is that it wasn't supposed to happen.

For many years, the conventional wisdom, certainly within the auto industry, was that carmakers would never introduce intelligent safety features so long as there

were plaintiff lawyers. Autonomous technology shifted the liability for accidents from the car's owner to the car's maker, said industry spokespeople, and was tantamount to corporate suicide.



Steve G. Steinberg, is a technology trend-spotter for the New York investment firm Gilder Gagnon Howe & Co., where he also founded and leads a small quantitative research group, and is principal of Steinberg Consulting. He can be reached at steve@steinberg.org.

Three developments changed their minds. First, active safety technologies have become substantially more robust, thanks to improvements in sensor design, and, most importantly, in sensor fusion and planning algorithms. Second, drive-by-wire has rendered the legal debate largely academic—car functions are already mediated by computers, one way or another. Lastly, and probably most importantly, the auto industry experienced an unprecedented, violently destabilizing, massive contraction. Technology that previously seemed like a grave, existential threat now seems like the least of their problems. It turns out that, innovation, like freedom, “is just another word for nothing left to lose.”

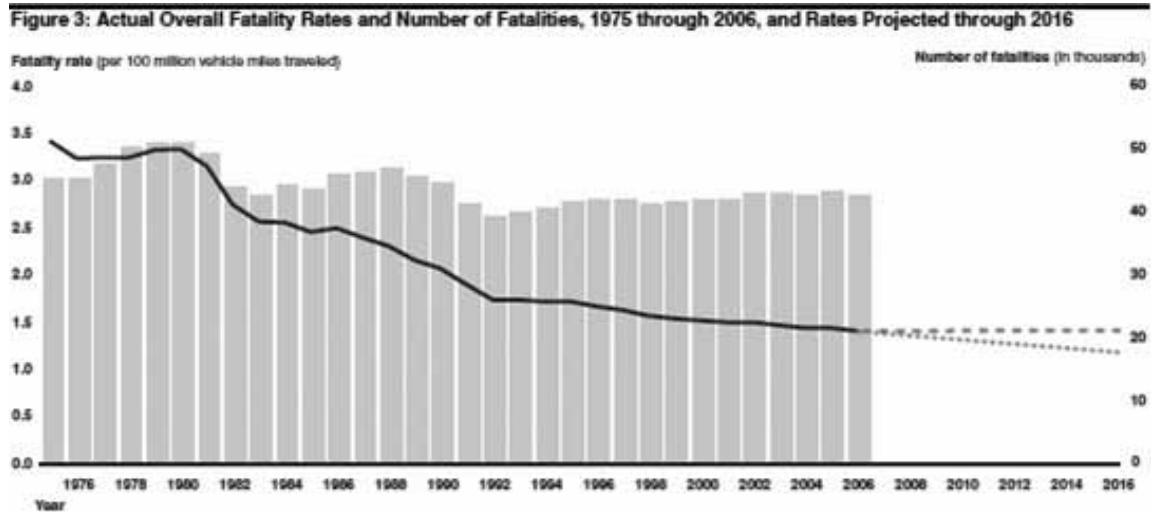
All those developments made autonomous technology possible, even practical. But the impetus to actually *do* something about it came from charts like the one below. The line shows the automotive fatality rate declining steadily for the last 25 years of the 20th century, from 3.5 deaths per 100 million miles traveled in 1975 to just over 1.5 deaths in 2000. Then the line flattens out. For the last 10 years the fatality rate has barely budged.

The gains in the 1980s and 1990s stemmed primarily from mechanical improvements in car bodies—better vertical rigidity, intentional crumple zones. By the end of the millennium, engineers were butting up against the physical limits of materials, chasing rapidly diminishing returns. Today, any significant decline in the fatality rate will have to come from changes in how cars are driven, or, ideally, *not* driven. And pressure is mounting: the extraordinary growth in texting and its deleterious effects on driver attention means that even holding everything else constant, the fatality rate will rise.

RISK COMPENSATION

This still begs the critical question: Do intelligent safety features *work*? Do they save lives and limbs? We know

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that changing lanes unintentionally and rear-ending a forward vehicle—the accident types the two most popular intelligent safety features address—account for a very significant percentage of fatalities, although estimates vary substantially. But we have almost no data on the efficacy of the new intelligent safety solutions, and what we do have is contested.

This uncertainty is surprising given that auto accidents are the leading cause of death for teenagers, and one of the top-ten causes for adults. You might think the National Highway Traffic Safety Administration rigorously evaluates new safety features, akin to how the FDA evaluates new drugs and devices.

That is not the case. At best, the NHTSA does some simple, unrealistic *in vitro* style tests. They never perform double blind experiments in the real world. Even the statistics the agency collects about automotive accidents are of dubious usefulness, due to poor sampling design and paucity of detail.

Still, we can thank the NHTSA for a recent report that at least throws the uncertainty about autonomous safety features into stark relief. The NHTSA had volunteers drive a test track in cars with automatic lane departure correction, and then interviewed the drivers for their impressions. Although the report does not describe the undoubted look of horror on the examiner's face while interviewing one female, 20-something subject, it does relay the gist of her comments.

After she praised the ability of the car to self-correct when she drifted from her lane, she noted that she would love to have this feature in her own car. Then, after a night of drinking in the city, she would not have to sleep at a friend's house before returning to her rural home.

This phenomenon, where improved safety spurs on greater risk taking, is known as risk compensation, or "risk homeostasis." Most of us became familiar with the concept from debates over anti-lock brakes (ABS), but its specter has plagued nearly every attempt to improve automotive safety, from seat belts to night vision. Yet almost nothing about risk compensation—its etiology, its prevalence, its significance—is certain.

To prove the phenomenon even exists, one particularly inspired British researcher had volunteers ride bicycles on a closed course, with half the people wearing helmets and proper attire, and the other half clad in their underwear. Graduate students positioned on the sidelines graded the volunteers performance and tallied any unsafe maneuvers. The results showed that the unclothed group practiced much safer driving habits, thereby supporting risk compensation theory—and Britain's reputation for eccentricity.

Many other, more targeted studies from the 1990s also painted automotive safety as a zero-sum game, with any gains in safety vitiated by greater risk taking. Not only did careful, well-designed experiments in Europe show that anti-lock brakes lead to more aggressive driving, but many of the countries that adopted seat-

“The key empirical development was the overwhelming success of electronic stability control (ESC).”

belt legislation found that auto fatalities barely budged, while the number of pedestrians injured by cars actually increased.

These studies make for fascinating reading but can be hard to integrate with common sense. Anyone who has driven a vintage car knows they do not feel as safe. Fortunately, over the last ten years the scholarly consensus has shifted—pushed by both empirical and theoretical developments—to a much more nuanced view.

The key empirical development was the overwhelming success of electronic stability control (ESC). Introduced in 1995, the technology works in conjunction with ABS to prevent over- and under-steer. The NHTSA reports that ESC reduces accidents by 35 percent—a number large enough to outweigh the study’s methodological shortcomings, which were legion. This success prompted researchers to reexamine ABS, and with the benefit of hindsight, many now believe that ABS is ineffective for very specific reasons. (Essentially, when the brake pedal automatically ‘pumps’, it disconcerts drivers and they instinctively raise their foot.)

Theoretical developments have had an even more profound effect on how we think about risk compensation. These developments reflect an ongoing revolution in statistical practice—enabled by Moore’s law as well as Bayes law—that allows us to peek into the black box of causation. Thanks to books like *Freakanomics* and Jared Diamond’s new anthology, the reverberations of this revolution have started to enter the public consciousness, but the full sweep of its implications remains vastly under-appreciated.

It is, admittedly, both technically and philosophically complex. But at the most concrete level, the use of MCMC (Markov Chain Monte Carlo) type methods to iteratively ‘solve’ Bayesian networks, allows us—in certain cases—to make strong claims about causes from naturally observed data rather than from carefully randomized experiments.

This may be easier to explain with an example.

Traditionally, to determine the efficacy of seatbelts in preventing fatalities, we would randomly assign people to two classes and then ensure that the control class never wore their seatbelt, while people in the other

class always buckled up. We could not simply look at people who *already* wear seatbelts and those who do not, because the people who naturally wear seatbelts are more likely to be naturally cautious drivers. We couldn’t even do the study longitudinally—by, say, looking at a country before and after seat-belt legislation—because confounding factors like a steadily aging population, or the growth in texting would distort our conclusions.

But these rules of statistical best practice are being overturned. There are now at least half-dozen studies that use sophisticated causal inference to tease apart the root causes and consequences of automotive safety. What they have found is satisfying in its lack of surprise. Concisely, risk compensation exists, but not universally—it is personality dependent. “Sensation seeking” is one blunt-edged, but not totally wrong, way to characterize the people who do exhibit risk compensation.

Nonetheless, the insight that intelligent safety features will only help a subset of the population can seem deflating. The big stories in technology are always the ones that surpass expectations.

I will argue that for at least one industry—the auto insurance—autonomous safety features *will* lead to better than expected performance. The argument, detailed below, is circuitous, but stems from the realization that the mathematical risk models auto insurance companies rely on have never described reality very well. The coming innovations in automotive safety will actually push reality in the direction of the model, making the business significantly more profitable.

INSURANCE: NOT AS BORING AS YOU THINK

But ... *In-sur-ance*. It does not whisper alluringly, like diamonds, or sigh seductively, like oil. It creaks; it pops. Insurance is not usually associated with fast-growing companies, charismatic CEOs, or technological discontinuities. The very nature of insurance seems most amenable to gradual, incremental progress. It’s safer.

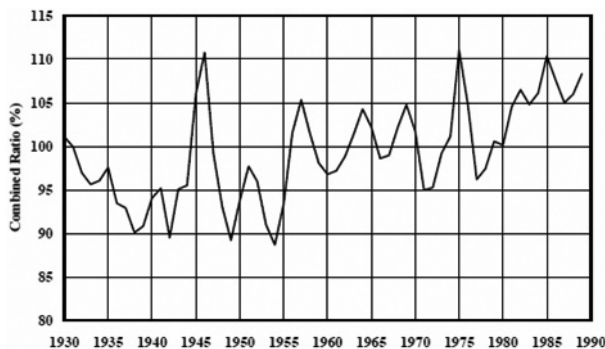
But don’t mistake characteristics of the recent past for inalienable traits. Study the history of insurance—as

CONTINUED ON **PAGE 8**

the industry's fastidious, compulsive record-keeping uniquely allows—and you notice that the most lucrative periods always come in the wake of big socio-technical changes. Changes that eliminate risk faster than prices can fall.

One of these changes can be seen in the example of fire insurance from 1907 to 1927. The massive destruction caused by the 1906 San Francisco earthquake and fire sets off a nation-wide overhaul of building safety codes, decisively reducing the frequency and potency of commercial fires. Or, perhaps more analogous to automotive safety: Marine insurance, late 1880s. Wood-and-sail ships are forcefully retired by faster and safer steel-and-steam vessels. England dominates in the construction and operation of these new steel ships, fostering a powerful local marine insurance industry and relegating American insurers to table scraps. Lloyds becomes *Lloyds*.

This same innovation-driven dynamic also occurs on the smaller, micro-scale as well, producing the cyclic pattern so characteristic of insurance industries. These cycles are often explained with vague suppositions to supply and demand, but those are rarely the real drivers—regulatory hurdles (for supply) and regulatory requirements (on demand) leech their force. Instead, small, predictable social and technical changes are constantly reducing risk, and thus cost. The regulatory rate setting process inserts a lag between a risk reduction and the associated drop in price, and *voilà: cycle!*



The chart below shows the historical combined ratio for auto insurance since 1930. (Remember, the combined ratio is incurred losses plus expenses divided by earned premiums. The further the ratio is below 100, the more profitable the underwriting.)

For context, today's auto insurance companies have combination ratios right at, or slightly above, 100 and

depend on ancillary services and investment income for profitability⁵.

You can easily make out the cycle starting just after 1945 and repeating every six or seven years. The initial peak was, of course, the end of WW II—gasoline was no longer rationed, servicemen returned, inflation soared—but the cycle was the result of the McCarran-Ferguson act, which resulted in most states regulating auto insurance rates, and passed in 1945.

I have shown that there are good reasons, both historical precedent and structural mechanisms, why significant risk reductions lead to increased profitability. What's left is to show that autonomous safety technologies will reduce the risk covered by insurers *more than is expected* ... even in the face of "risk compensation."

ACCIDENT THEORY

To do this, you first need to understand how auto insurance companies think about accidents.

Anyone who has had a car accident knows there are two perspectives. Other people's perspective, also known as the negligence theory, which says accidents are the result of momentary carelessness. Or *coincidence theory*, which says that if you drive enough miles, something bad is bound to occur.

Both, of course, have some element of truth. Your grandmother is truly a hazard, despite only driving to church on Sundays. And Mario Andretti would have accidents too, if he commuted three hours to work. The question is which factor dominates,

The data unequivocally says the latter. Accidents are most correlated to the number of miles driven. To put it in actuarial terms, miles driven is an exposure variable, and is multiplicative, while negligence is a class variable, and additive.

Nonetheless, for historical, political, and idiosyncratic reasons, insurance premiums have always been firmly rooted in negligence theory. It is this tension—between how insurance companies think about accidents, and how accidents actually are—that leads to logical inconsistencies and inefficient pricing.

For example, insurance companies almost never consider “no-fault” accidents when evaluating your driving record. (In fact, doing so is prohibited in some states.) However, no-fault accidents are an extremely good predictor of future *fault* accidents. The correlation would be bizarre if accidents were truly the result of negligence, but makes perfect sense if accidents are largely stochastic.

A far more pernicious inefficiency stems from the empirical correlation between low credit scores and auto accidents. Insurance analysts, viewing the world through negligence theory blinders, explain the higher number of accidents by characterizing people with bad credit as impulsive, reckless, and frankly not that sharp. This explanation, in only marginally more polite terms, is frequently trotted out as fact in the popular press.

It is fallacious.

The real explanation is more subtle. Because insurance acts as a *per-car* tax, people naturally try to reduce the number of cars they have assessed. In practice, this means letting the insurance on their second vehicle lapse, and using their primary car exclusively. Both actions increase the average miles driven per poor-credit person car and, therefore, the number of accidents per-PCPC. The unfortunate end game is that people with less money are stuck with disproportionately high insurance premiums

The solution, say some policy experts, is to price insurance on a per-mile, rather than per-car, basis. People with poor credit would be disincented to drive, and would thus have fewer accidents and lower premiums.

Coincidentally enough, in the last two years, nearly every auto insurance company has announced just such a “pay-per-mile” plan with an excess of fanfare. Even insurance companies like to be on trend, and this press release stampede was all about a shiny new piece of technology: the secure GPS system, used to track miles driven.

Try to actually sign up for one of these per-mile plans, however, and you will face a seemingly infinite number of obstacles. Most insurers killed the plans before the press releases went cold because they would have been a drag on profits. It is easy to see why: all the customers who drive very little would sign-up for the GPS programs, leaving just the long haul drivers in the pool.

The cross subsidies and mixing of means that lies at the heart of any insurance program would be eliminated.

Autonomous safety features offer a much more sustainable model for insurance companies. The computational car will allow the majority of drivers—the non-risk takers—to reduce their chance of accident asymptotically, to the point where miles driven is no longer the determining factor. Then, insurer’s models, which price as if your personality rather than miles driven controls your accident rate, will accord with reality.

ECONOMIC PERFORMATIVITY

This counter-intuitive phenomenon—the real world remade in the form of the model, rather than the model adjusted to reflect reality - is currently a hot topic among economists, under the rubric of ‘performativity’. It turns out to be a surprisingly ubiquitous process, underlying many economic developments. The canonical example is the Black-Scholes equation, first published in 1973. Before then, option prices on the Chicago Board of Trade varied markedly from what Black-Scholes predicted. Within a few months of the equation’s publication, however, options were trading in-line with theory.

In other words, Black-Scholes became an accurate model of option pricing ... because people began using it to price options. But it was also self-fulfilling in a deeper sense. Just as models in physics rely on simplifying assumptions—frictionless inclines, no wind resistance—Black-Scholes assumes zero transaction costs, unlimited borrowing at the riskless interest rate, and unconstrained short-selling. These were all wildly unrealistic in the pre-E*TRADE world of 1973. However, as regulators adopted Black-Scholes to govern everything from bank risk to executive compensation, the model’s assumptions rode along like stowaways, becoming deeply embedded in economic policy. The world was remade in the model’s image.

Performativity is a powerful prism to view events through, but like previous big ideas—Kuhnian paradigms, Shannon information theory—it is in danger of being over-used to the point of meaninglessness. ■

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The ERM Rainbow

By Alice Underwood and David Ingram

WHAT IF THERE WAS A LAW THAT EVERYONE MUST HAVE THE SAME FAVORITE COLOR?

It would be so much more efficient! We would only need one color of paint for cars, for houses, even for furniture and toys. Clothing stores would take up much less space. Society could save huge amounts of wasted money and put it to more productive purposes. The single-color system would make the world a more peaceful place: fewer arguments between parents and children about what to wear in the morning, between couples over how to decorate the living room ... everyone's stress level would be reduced with a best color pre-determined for all of us.

Something along these lines was once tried. Henry Ford famously declared, "Any customer can have a car painted any color that he wants so long as it is black." This strategy simplified production—and black paint dried faster than other colors, reducing time on Ford's assembly lines. The monochrome approach was wholly aligned with Ford's focus on efficiency. But the situation didn't last. People wanted cars in different colors and eventually Ford had to start providing them.

Even if somehow a law were passed decreeing a universal favorite color, it wouldn't change people's individual preferences. Those whose true favorite color was something else might go along; *pretending* to change their preference to avoid penalties, but most would seek out their real favorite whenever the color police weren't looking.

Lately, risk management authorities have been trying to tell firms how they should think about and manage risk. People who have labored in risk management through the boom period before the crisis—a period when risk managers were largely

ignored—are very happy that those authorities may finally be empowered to force firms to get with the program. But, such decrees are not working and will not work, because individuals and companies have risk perspectives that cannot be changed by fiat—any more than mandating a favorite color for everyone would change anyone's *real* favorite color.

Corporations and the human beings who run them have their own views of risk and risk management. These perspectives have formed over time, in response to personal experiences and the changing business environment, influenced by watching various strategies succeed or fail. Studies show that risk perspectives fall into four broad groups with almost wholly incompatible views—and only one of those four perspectives is totally compatible with the current paradigm of enterprise risk management (ERM). If proponents of ERM do not offer approaches that make sense for each of the four risk perspectives, ERM could become as obsolete as the Model T.

FOUR DIFFERENT PERSPECTIVES ON RISK

The four basic risk perspectives were first discovered in the context of research that was not originally seeking to study risk attitudes. But clear patterns emerged in the data and have proved quite resilient over time. Most people tend to identify with one of the following perspectives:

- **Profit Maximization.** This perspective does not consider risk very important—*profits* are important. Businesses managed according to this perspective will accept large risks, so long as they are well compensated. Managers who hold this perspective believe that risk is mean reverting—gains will always follow losses—and the best companies will have larger gains and smaller losses over time.
- **Conservation.** According to this perspective, increasing profit is not as important as avoiding loss. Holders of this view often feel that the world is filled with many, many dangerous risks that they must be very careful to avoid.
- **Risk Reward.** Careful balancing of risks and rewards is the heart of this perspective. Firms that hold this view employ experts to help them find risks offering the best rewards, while at the same time



Alice Underwood, FCAS, MAAA, PhD, is executive vice president at Willis Re Inc in New York, N.Y. She can be reached at alice.underwood@willis.com.



David Ingram, FSA, CERA, MAAA, is senior vice president at Willis Re Inc in New York, N.Y. He can be reached at dave.ingram@willis.com.

managing these risks to keep the firm safe. They believe that they can balance the concerns of the first two groups, plotting a very careful course between them.

- **Pragmatism.** This perspective is not based on a specific theory of risk. Pragmatists do not believe that the future is very predictable—so, to the greatest extent possible, they avoid commitments and keep their options open. They do not think that strategic planning is especially valuable, but rather seek freedom to react to changing conditions.

Each of the different perspectives leads to a strategy for dealing with risk. Firms led by Profit Maximizers seek out risk, believing that no risk is inherently unacceptable—every risk presents an opportunity, and the trick is to negotiate appropriate compensation. Conservation-oriented firms shun risk of all sorts. Risk reward firms carefully manage and calibrate both the amount and type of risk. Pragmatist firms seek diversification but otherwise have no overarching strategy—they operate tactically, reacting to each new development.

RESISTANCE TO THE CURRENT ERM PARADIGM IS INEVITABLE

The ERM paradigm currently touted as the solution to all risk problems comes straight out of the risk reward (RR) playbook. ERM helps firms with a RR orientation to do a better job at what they were trying to do anyway.

But, given the four fundamental risk perspectives (and various hybrids thereof), it's hardly surprising that adoption of ERM has been less than universal and often less than enthusiastic. No matter how reasonable ERM sounds to its RR-oriented proponents, it does not align as well with other risk perspectives. In many cases, managers are only pretending that ERM is their new favorite color.

Profit maximization (PM) firms see ERM as an unnecessary restriction. Why should a limited risk appetite be enforced, when any risk can be accepted for the proper price? That means turning away potential profit! If a PM firm bows to outside demands for ERM—such as those imposed by a rating agency or regulator—this may be largely a charade, a sop to the unrealistic pessimists and worrywarts.

For conservation (CO) firms, ERM is a dangerous strategy because it encourages taking more risk. Establishing a risk appetite would only give permission to the cowboys in the ranks to expand risks to fill that risk budget. While such a firm may—with trepidation—adopt an ERM program, CO managers remain convinced that risk assessments can never be comprehensive enough; risk quantification cannot be trusted because the result is always too low.

Pragmatic (PR) firms do not trust risk assessments either. But they are not sure whether the existing assessments are too optimistic or too pessimistic. Adherents of the PR perspective think that ERM takes too constant a view of an ever-changing world. In their minds, ERM means letting a model run the company. And a fixed set of rules and metrics hamper their ability to react to changing circumstances.

In a world of multiple risk perspectives, an RR-only approach to ERM is as self-limiting as an auto manufacturer that offers “any color you want, as long as it's black.”

ERM NEEDS A BIGGER TENT

The truth is, risk management in one form or another has been practiced since the dawn of time—by adherents of *all* of the four basic risk perspectives. And it would be difficult to argue that adding an enterprise-wide view to any risk management strategy is not beneficial. A broader and more flexible definition of ERM would bring more managers and more firms “into the tent,” enabling the benefits of an enterprise-wide view of risk to be realized more broadly.

A review of the literature suggests that there are four different strategies that fall under the general heading of risk management:

- **Loss controlling.** This is the most traditional form of risk management; it seeks to identify and mitigate the firm's most significant risks. Commonly practiced by non-financial firms, loss controlling also applies to financial risk; examples include the careful underwriting of loans or insurance policies, as well as the

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practice of claims management. Risk management of this sort is not new—but the inclusion of an aggregate, firm-wide view of risk is a relatively new development that could be termed loss-controlling ERM. This type of ERM is favored by CO firms.

- **Risk trading.** A newer form of risk management, this approach arose from bank trading desks and the insurance industry. Risk trading focuses on getting the price of risk correct—which leads to sometimes complicated models of risk, reward, and economic capital. While a risk trading strategy can be applied on a transaction-by-transaction or other “siloe” basis, establishment of a consistent risk valuation on a firm-wide level is risk trading ERM. This type of ERM is favored by PM firms.
- **Risk steering.** Under this strategy, the ideas of risk trading are applied at a macro level to the major strategic decisions of the firm. Here, rather than focusing on the proper price of risk, the question becomes one of how much risk the firm *should* take—and how to steer the firm in that ideal direction. By its very nature, this is an enterprise-wide approach. Perhaps this is why some seem to think that only risk steering ERM is “real” ERM. Risk steering ERM is highly favored by academics and consultants; RR firms find it appealing, but firms that hold any of the other three strategies do not.
- **Diversification.** Spreading risk exposures among a variety of different classes of risks, and avoiding large risk concentrations, is another traditional form of risk management. Formal diversification programs will have targets for the spread of risk with maximums and minimums for various classes of risks. The newer ERM discipline adds the idea of interdependencies across classes, providing better quantification of the benefits of risk spreading. Pragmatists tend to favor diversification because it maximizes their tactical flexibility, but they avoid reliance on any particular risk mitigation process and often mistrust quantitative measurement of diversification benefits.

We believe that limiting the field of ERM to risk steering ERM alone would be a serious error. Such a restrictive definition of ERM would alienate firms and practitioners holding any of the other three risk perspectives. Moreover, such a limited view is inherently

incomplete, for reasons that the pragmatists know all too well.

Simply put, the world does not stand still.

CHANGING RISK ENVIRONMENTS

Why do different people prefer different colors? That’s a difficult question, influenced no doubt by personality, individual differences in color perception, and early experiences and associations. The existence of the four different risk perspectives may be easier to explain—and clearly a key factor is that, over time, the risk environment changes.

A simplistic model of changes in the risk environment might posit that either things are “normal” or they are “broken.” But people do not necessarily agree about what is “normal.” An observer viewing the world through the lens of conservation might say that extreme hazard and danger are the “normal” state of affairs—while a profit maximizer, finding this view timid and overly pessimistic, might argue that profitability is “normal” and hazardous conditions prevail only when the market is “broken.”

Expanding the model to allow more than two states allows for the possibility that both the conservation view and the profit maximization view can make sense. Consider a model with four risk regimes:

- **Boom times.** Risk is low and profits are going up.
- **Recession.** Risk is high and profits are going down.
- **Uncertain.** Risk is very unpredictable; profits might go up or down.
- **Moderate.** Both risk and profit fall within a predictable range.

Such a model seems to be a reasonable description of economic cycles—whether in the banking world, the insurance sector, or the broader economy. As the cycle moves through these four different states, external conditions match the worldview of each of the four different risk perspectives. Each perspective has been right part of the time—and will be again, at some point in the future. But none of the risk perspectives is perfectly adapted to external conditions all of the time.

“ In any given risk environment, companies holding a risk perspective and following an ERM program aligned with external circumstances will fare best. ”

RR purists may object that their view takes into account the full range of the cycle. But, economic cycles are not sine curves; the period and amplitude are irregular, unexpected “black swan” events do occur, and there are always “unknown unknowns.” Model risk can never be eliminated, and restricting ERM to a RR-only view obscures this important fact.

A risk-steering ERM program works especially well in the moderate risk environment when risks are fairly predictable. But in a boom times environment, firms following such a program will unduly restrict their business—not as much as conservation firms, but certainly more than profit maximizing firms—and more aggressive competitors will be much more successful. In the recession environment, a risk steering ERM program again advocates a middle path; this may mean the firm sustains too much damage to be positioned to take full advantage of the market when it turns. When times are uncertain, a firm following a risk steering ERM program will be frustrated by frequent surprises and a world that does not quite fit the model. Competitors not tied to a particular view of risk will fare better, making decisions in the moment with maximum flexibility.

Why do corporations adhere to a particular risk perspective? The firm may have been formed during an environment aligned with their perspective. Alternatively, the company may have suffered traumatic damage during a period of dissonance between an old perspective and the risk environment and then made a shift, perhaps under the direction of new leadership. The firm may have been wildly successful at some point in the past, and now cling stubbornly to the strategy that worked for them then. Corporate culture tends to be self-perpetuating: individuals are drawn to employers with a perspective that makes sense to them—and those in a position to make hiring decisions typically prefer to hire staff whose views mesh with their own.

In any given risk environment, companies holding a risk perspective and following an ERM program aligned with external circumstances will fare best:

Risk Environment	Boom	Recession	Uncertain	Moderate
Risk Attitude	Profit Maximizer	Conservator	Pragmatist	Risk Reward Manager
Risk Management Strategy	Risk Trading	Loss Controlling	Diversification	Risk Steering

Yet in each risk regime, there are companies following strategies that are not well aligned with the environment. Some of these firms muddle along with indifferent results and survive until their preferred environment comes back. Others sustain enough damage that they do not survive; some change their risk perspective and ERM program to take advantage of the new environment. Meanwhile, new firms enter the market with risk perspectives and ERM programs that are aligned with the current environment.

Since many of the poorly aligned firms shrink, die out, or change perspective—and since new firms tend to be well-aligned with the current risk regime—the market as a whole adjusts to greater alignment with the risk environment via a process of “natural selection.”

RATIONAL ADAPTABILITY

In order to thrive under *all* future risk regimes, a firm ideally would follow a strategy of rational adaptability. This involves three key steps:

- Discernment of changes in risk regime.
- Willingness to shift risk perspective
- Ability to modify ERM program

The difference between rational adaptability and the process of “natural selection” described above is conscious recognition of the validity of differing risk perspectives and proactive implementation of changes in strategy.

Individuals often find it difficult to change their risk perspective. Therefore, a company that wishes to adopt

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The ERM Rainbow | from Page 13

rational adaptability must ensure that its key decision-makers represent a diversity of risk perspectives. Furthermore, the corporate culture and the managers themselves must value each of the risk perspectives for its contributions to the firm's continued success.

An insurance company is best served by drawing on the respective expertise of underwriters, actuaries, accountants, contract attorneys, and claims experts—and members of one discipline should not feel slighted when the expertise of another discipline is called upon. Similarly, any firm that wishes to optimize its success under each of the various risk regimes should have profit maximizers, conservators, risk reward managers, and pragmatists among its senior management; and those who hold any one of these risk perspectives should acknowledge that there are times when another perspective should take the lead. The CEO must exercise judgment and restraint, shifting among strategies as needed and shifting responsibilities among the management team as required.

Rational adaptability recognizes that during boom times, risk really does present significant opportunities—and it is appropriate to empower the profit maximizers, focusing ERM efforts on risk trading to ensure that risks are correctly priced using a consistent firm-wide metric. When the environment is moderate, the firm employing rational adaptability will give additional authority to its risk reward managers, examining the results of their modeling and using these to reevaluate long-term strategies. And in times of recession, a firm following rational adaptability shifts its focus to conservation: tightening underwriting standards and placing special emphasis on firm-wide risk identification and risk control. Resisting the pull of his or her own personal risk perspective, the CEO must be willing to listen—and act—when others in the firm warn that the company's risk management strategy is getting a little too monochromatic.

HARMONY

Although rational adaptability may well be an ideal solution, it requires the accomplishment of two very difficult tasks at the same time. The firm must recognize the change in risk environment at the earliest possible time, and be willing to change risk attitude and risk strategy quickly. Achievement of either of those tasks is not easy or common.

An alternative is to seek to find harmony from the discordant voices within the firm that represent the four risk attitudes. And all four voices will exist within most firms. To achieve harmony, the risk committees must provide seats not just for the managers in the firm who believe fervently in the risk models and the risk steering programs that are based upon those models, but also for those who distrust such models. Most risk committees are populated by managers and maximizers. An unsteady coalition between those two perspectives forms the core of most businesses, and experienced business people can often tell stories of classic battles between the two points of view.

Conservators and pragmatists are usually present as well, but their views are not always welcomed in discussions about major corporate decisions. They may have learned to keep their ideas to themselves. However, they should also be represented in the risk management process because their views of risk will sometimes be more appropriate to the risk environment than the views of the maximizers and managers. The trick to creating harmony from these various points of view is to get all members of the risk committee to acknowledge that each of the four perspectives offers value to the organization, and to encourage each of the four to speak out.

Every harmonious firm will create its own unique compromises among the four views. Different firms will choose different times and ways to honor the inherent caution of the conservators, to heed the pragmatists' call for diversification, to follow the models of the risk reward managers, or to give the profit maximizers greater scope to grow. The resulting strategy will never seem perfectly "right" to any of the four groups. But as the environment shifts among moderate, boom, recession and uncertain regimes, the harmonious firm will be able to show reasonable success in each environment and avoid unreasonable failure.

CONCLUSION

In the open market for goods and services, the firms that are best able to adapt to the market's changing demands will enjoy the greatest success. No firm can be all things to all customers, all of the time; but a firm that too severely limits its offering, focusing on too

narrow a market segment, may wind up making itself irrelevant. Philosophies of risk management face much the same situation.

A recent study by Kay, Goldspink, and Dyson sought to explore attitudes towards ERM by assessing the predominant risk perspective exhibited by various professional groups. Their results show that “[k]ey aspects of the Hyper-Rational approach favoured by the actuaries were often seen as irrelevant to, or explicitly rejected by, the Operational and Strategic sub-groups.” While resistance to ERM is sometimes blamed on poor communication, this study suggests that “any communication issues are symptomatic of the broader paradigm issues described above, not the cause ... the issue is that stakeholders don’t believe the validity of the message.”

In order to gain traction across the full spectrum of human risk perspectives, the discipline of ERM must include approaches that fit the profit maximizing, conservation, and pragmatic risk perspectives as well as the risk reward perspective. And, in order to remain relevant and help firms flourish in all risk environments, ERM must embrace a Harmonious approach, drawing from the entire palette of strategies to suit the changing environment. ■

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Responding to Systemic Risk¹

By Stephen W. Hiemstra²

THE NEED TO CREATE A SYSTEMIC RISK REGULATOR HAS BEEN ACTIVELY DISCUSSED IN RECENT MONTHS.

The need is obvious, but a workable problem definition has yet to emerge. What system led to these losses; who controls it; and what exactly can be done about it?

If international financial markets are a single market system, then no single regulator has complete control. This simple statement implies that systemic risk regulation poses a serious boundary-management problem because systems without boundaries are potentially unstable.



Stephen W. Hiemstra, is a financial engineer living in Centreville, Va. He can be reached at Hiemstra@yahoo.com.

From a policy perspective, recognizing this problem requires that regulators move from a static to a dynamic concept of regulation and understand trade implications. Unlike a static market system where regulators make the rules and control the boundaries, a dynamic system is constantly adjusting to shocks that can either be dampened or amplified by regulatory intervention. Regulators face an inherently more complex task than traditional financial regulation of markets isolated within autonomous administrative jurisdictions.³ The most obvious trade implication is that

all aspects of market policy need to be roughly in synch with our trading partners to avoid setting off disequilibria.

Much remains to be done in preparing to meet this challenge.

PUTTING THE SYSTEM BACK IN SYSTEMIC RISK

A fairly typical, technical definition of systemic risk is the probability that large numbers of firms, especially financial firms, could fail during a given time period. This definition is helpful in identifying systemic losses after the fact that presumably might be modeled. This definition is less helpful in identifying systemic losses before the event because systemic events tend to be historical anomalies.

What is the system in view in financial markets?

One view is to picture financial markets with a sports analogy.⁴ Picture three sports games being played in a park: baseball, basketball, and soccer. Each ball-field is separate. On each field, players compete and a referee officiates. Even if the fields overlap slightly, everyone knows their role and the games proceed in a fairly predictable manner.⁵ This analogy might suitably depict the U.S. financial markets before 1980 for thrifts, insurance, banking, and securities (see chart, left side). At that point, firms were mostly small relative to their markets, market overlap existed but was minimal, and regulators managed market boundaries in a fairly orderly manner from the 1930s on.

This framework began to change in the 1980s with interest-rate deregulation, changes in the tax code in 1986, and a number of crises—in banking, international lending, thrifts, farm credit, and stock market trading. In the 1990s, we further dismantled the firewalls between investment and commercial banking, interstate banking, thrifts, and insurance.⁶ Enterprise risk management (ERM) became

FOOTNOTES:

¹ This article summarizes comments given at the Symposium on Systemic Risks and Regulation sponsored by the Enterprise Risk Management Institute International, the NAIC's Center for Insurance Policy and Research, the Robinson College of Business of Georgia State University, and the Joint Risk Management Section of the SOA/CAS/CIA held on May 11-12, 2010 at Georgia State University in Atlanta, Ga.

² Dr. Hiemstra is an economist and financial engineer living in Centreville, Virginia. In 2007 and 2008, he served on the program committee for the Enterprise Risk Management Symposium. For more details about the ERM Symposium, see: www.ERMSymposium.org. Dr. Hiemstra has also been a contributor to research of the Enterprise Risk Management Institute International (www.ermii.org). Dr. Hiemstra published an earlier article in Risk Management magazine on systemic risk entitled: Putting the System Back in Systemic Risk (June 2010).

³ To employ an agricultural metaphor, static regulation is like managing cattle with fences, while dynamic regulation is a cattle herding problem.

FOOTNOTES:

⁴ Friedman (2002, 15) also likes this analogy.

⁵ The objective of the game is to test the skills of the teams and players holding the rules constant. Likewise for capitalist firms, the objective of the competitive market is to assure that the highest rate of return accrues to the most efficient producer.

⁶ The U.S. moved to adopt the Japanese model of universal banking in the 1980s. For a taste of the policy discussion, see: (Wellons, 1985).

popular in the late 1990s as firm size rose and the need for more disciplined management strategies became obvious.

Large, interconnected firms now dominate many financial markets and are regular players in international markets. As depicted in the chart (right side), a large bank may be subject to a number of regulators—the Federal Reserve at the holding company level, one or more bank chartering agencies (the Office of Thrift Supervision, the Office of the Comptroller of the Currency, a state comptroller), one or more insurance regulators, the Securities and Exchange Commission, and even the Commodity Futures Trading Commission. In good times, overlapping regulation leads to regulatory specialization and prudential management. In bad times, it may be unclear who has ultimate authority for firm supervision.

Returning to our sports analogy, what would happen if we tried to play soccer, basketball, and baseball on the same field at the same time? What if one of the players looked like the Jolly Green Giant and was able to change the rules of the game?⁷ This analogy is not far off because increasing world financial markets behave as a single, integrated market, but with different rules for different players and some players are large enough to influence the rules in multiple counties.

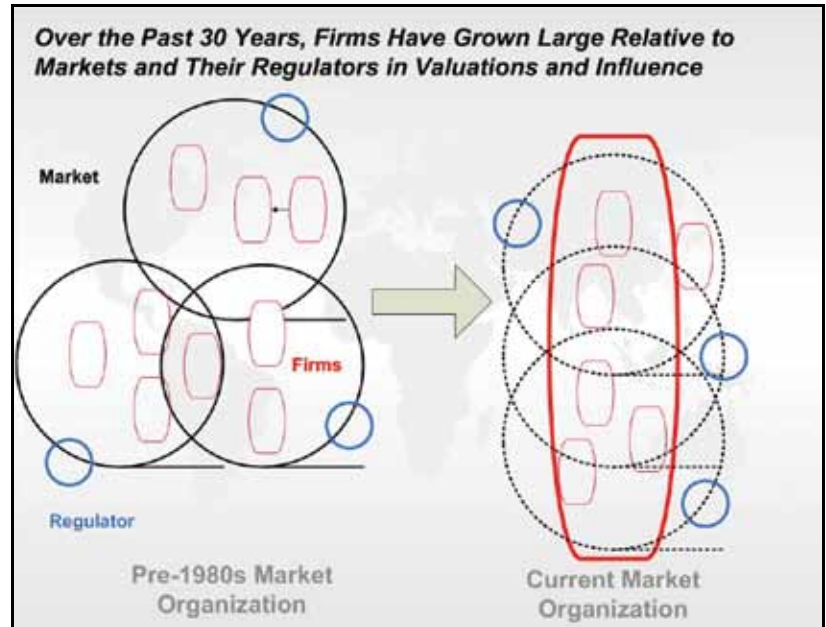
WHAT IS THE SYSTEM?

Financial markets can be pictured as a single, world-wide system.

An important condition for financial system stability is that regulators have effective control over the entire market system. If they do not because the market extends beyond their administrative control or it includes products that they do not understand, then the boundaries of the market system are unclear and stability is not easily assured. In an open, international market, no national government can maintain the boundaries on the market as required in conventional regulation.

FOOTNOTES:

⁷ Size is not the only issue, but it is easier to picture. Modern corporations are typically organized as conglomerates and span many markets. AIG was not a big firm so much as a complex and interconnected firm.



In this sense, market instability can be described as a boundary-management problem.

WHAT IS SYSTEMIC RISK?

Systemic risk is the probability of a future loss due to instability in system boundaries which results in large numbers of firm insolvencies.

This definition of the problem poses an implicit measurement problem. Because boundaries in an open system are hard to define, systemic risk cannot be easily measured. Losses would have to be measured by drawing concentric circles of influence around triggering events—an inherently difficult task both conceptually and empirically.

The current market poses increased systemic risk because financial markets can no longer be characterized as stable, well-defined, and easy to supervise. Instead, markets are subject to firms that are large relative to national markets and their regulators, to products that are highly complex, to policy processes that are dynamic, and to world market influences that are mostly unregulated. Open-ended systems are inherently more dynamic (less stable) than closed systems.

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NEED TO DAMPEN PERTURBATIONS

If the objective is to make sure that systems are dynamically stable, then regulators constantly need to dampen perturbations that they do not control. Slowing portfolio turnover rates, for example, would allow regulators more time to respond to perturbations that they observe. How then can a financial system become unstable?

Three mechanisms can lead to system instability.

First, the best-known systemic problem occurs when normally random behaviors are suddenly correlated. The classic case is the run on the bank.⁸ Fear leads depositors to run to the bank and withdraw accounts resulting in a liquidity crisis. Unexpected micro-behavior leads to system instability.

Second, the central bank can print too much money leading to inflation or market bubbles. This can lead to instability by masking the true financial position of firms practicing book value accounting and undermining prudent management decision-making. Boundaries between markets become less obvious because weak and strong market players may perceive the same financial results even when the quality of their management is vastly different.

Third, weak policy decisions can lead to boundary management problems. Over-reliance on currency pegs, for example, has frequently led developing countries to pursue trading policies that proved unsustainable and have collapsed unexpectedly. Domestic analogies frequently resolve around weakening of prudential standards—especially loan underwriting policies—which amplify credit cycles.

FOOTNOTES:

⁸ Interestingly, financial modeling can also lead to this result because most modelers employ similar methods. Think of a model as a tool for forming market expectations. If everyone has homogeneous expectations, any shock to the system has the potential to generate herd behavior. The 1987 stock market panic is the classic example of this problem.

⁹ Limited liability incorporation has always implied that society was willing to absorb systemic risk. This is because the existence of firms to provide products and services is a benefit to society and absorbing this risk as a society implies a preference for a higher rate of economic growth. At what point, however, does the systemic risk premium become large relative to the prospective benefit due to additional economic growth?see: (Wellons, 1985).

LAW OF ONE PRICE

Because financial markets are open to international trade, the law of one price applies. The law of one price comes from international trade theory and it simply states that there can only be one price for a product in the international market, adjusting for policy interventions and accounting for the cost of transportation. The implication is that domestic regulators can by their actions influence not only the variance of the price of a financial product, but also its price.

The original Basle agreement is a case in point. The Basle I agreement in 1988 was motivated by the United States' unhappiness with the lower cost of capital in Japan. International capital standards were imposed to reduce the competitiveness of Japanese banks and, by implication, to raise the competitiveness of U.S. banks. Tinkering with bank capital standards was accordingly motivated by factors having nothing to do with prudential bank supervision.

The implication for systemic risk regulation is that each and every action taken by regulators in an open market has the potential to encourage or discourage international competitiveness. For this reason, the increasing importance of systemic risk motivates generally greater sophistication in supervisory oversight. The usual focus only on financial risk taking is no longer sufficient. Good financial supervision policy has to be informed by an understanding of implications for our trading partners.

PRINCIPLES OF PUBLIC REGULATION

In order to reduce systemic risk, we need to recognize that the boundary-management problem and look for ways to dampen perturbations. Reinstating a static framework is not an option. We want dynamic and innovative financial markets because they contribute to growth in the economy and are necessary for efficient resource allocation in an open system.

To this end, let me propose some principles for public regulation, including:

- Risk taking and economic growth need to be balanced.⁹
- Regulations need to be drafted which encourage competitive markets and improve transparency to keep product costs low.

“ In effect, large and complex firms are not too big to fail, but they may be too big to manage and supervise. ”

- Market power should not be allowed to translate into political power, especially relative to public regulation.
- While adjustment is necessary, the public has an interest in decelerating portfolio turnover rates and encouraging longer term investment.
- Building public confidence in markets, in the quality of financial disclosures, and in the integrity of financial supervision is important not only for domestic, but also international investors.

In the absence of competitive markets, regulation in the classic sense (left side of the flow chart) is almost undoable because of lags in the information and expertise available to the public sector. Competition forces markets to police themselves—a necessary condition when contracts are complex and change quickly. In this respect, the emergence of numerous firms considered to be too big to fail is a key policy problem affecting systemic risk management. In effect, *large and complex firms are not too big to fail, but they may be too big to manage and supervise.*

ROLE OF ENTERPRISE RISK MANAGEMENT

ERM is presumably a key strategy for offsetting aspects of systemic risk arising from undisciplined firm behavior. Legislators and regulators could, for example, require large firms to have a chief risk officer and to offer safe-harbor protections for whistle-blowers.¹⁰ We presumably know how to do these things.

The current crisis has raised questions about whether ERM is a practical solution in view of problems with both the business and political culture. We seem unwilling or

unable to impose the management and regulatory discipline required to mitigate systemic threats when profitability would suffer.¹¹ In theory at least it is possible to write rules that would dis-incent largeness beyond the point of market efficiency. Examples include:

- Require increasingly greater transparency, reporting, and capital.
- Impose additional governance and compensation restrictions on boards to discourage or remove unsound political feedback loops.
- Downsize firms receiving bailouts recognizing that they have proven themselves too big to manage.

However, the question—how big is big?—is unanswerable without setting off a political process even though in principle research could be used to devise an objective criteria.

In the absence of a willingness to answer the question and to impose discipline on these systems, we will continue to suffer systemic losses without much hope of mitigating their effects. ■

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FOOTNOTES:

¹⁰ Similar watchdog requirements and safe-harbor protections are needed for other professions involved in managing the integrity of information and decision processes within firms. Promoting enterprise risk management requires safeguards for maintaining management discipline.

¹¹ In our sports analogy, the markets behaved in the sub-prime crisis like a soccer game populated with seven-year old players. What one observes is a ball being chased by 22 kids with no one practicing zonal or man-to-man defense. In such a game, referees are hopelessly overwhelmed and cannot provide the usual discipline expected in a soccer match.

Economic Capital: A Case Study to Analyze Longevity Risk

By Stuart Silverman

FOR SOME TIME NOW, INSURERS HAVE REFLECTED VOLATILITY IN ASSET RETURN ASSUMPTIONS

when determining capital requirements, but have largely disregarded the impact of volatility on their liability assumptions when performing stochastic analysis. Considering the acknowledged expertise of insurance companies in managing the

liability side of the balance sheet, these disparate approaches raise the question: why?

Factor-based capital models—which ignore the inherent volatility in mortality trends—could potentially understate

future economic capital needs. This shortcoming, however, can be overcome with the adoption of a principle-based approach that uses stochastic techniques and dynamic assumptions for mortality among a variety of other variables.

Over the past century, life expectancies increased significantly. But, mortality improvements occurred not in a steady upward rise but rather in fits and starts. While life insurers have largely benefited from mortality improvements that were greater than expected, the same is not likely to hold true for insurers in the longevity-protection market, based on past trends. For these companies, understanding the potential volatility embedded in future mortality rates could mean the differences between profit and loss.

Mortality volatility can come from a number of sources. Assumptions about baseline mortality tables may be inconsistent with the actual experience of an insured population. The disparity can be especially problematic in pricing the closeout of a pension plan for which generic industry mortality tables provide the main source of experience.

Lifestyle changes, medical breakthroughs, or the discovery of a blockbuster drug may also contribute to a fundamental shift in basic assumptions. Each could change the mortality curve in unprecedented ways, creating unforeseen volatility in insurers' longevity-based economic liabilities—with longevity risk not accounted for at all in

current risk-based capital (RBC) formulas. The question is: how much of a capital shortfall might an insurer face because of the longevity risk embedded in its portfolio?

ISOLATING LONGEVITY BY EXAMPLE

This issue can be addressed by examining a case study that compares the capital requirement produced by the statutory RBC formula to that generated by a principle-based model using dynamic assumptions for mortality. As part of this analysis, we effectively controlled all risks other than longevity, which enabled us to identify the economic liability arising solely from longevity risk.

For the purpose of this case study, we used a block of single payment immediate annuities (SPIA), described in the table in Figure 1.

Figure 1:
Single Payment Immediate Annuity Business

Age	Annual Benefit	Lives
65	50,000	7,000
70	43,600	6,000
75	38,800	5,000
80	34,200	4,000
85	27,700	3,000

A SPIA has two risks—investment and longevity—and provides an ideal tool for a discussion of longevity risk once steps are taken to control the investment risk.

STATUTORY RESERVES AND CAPITAL

We started the comparison by calculating statutory reserves and capital for this block of business.

Statutory reserves are calculated on a deterministic basis with a prescribed mortality assumption, currently the Annuity 2000 mortality table. To build in a level of conservatism, the basic table's mortality rates are reduced by 10 percent. While this approach is well-intended, results will show that the use of a flat discount rate ignores any future improvements in mortality.

RBC requirements are developed from formula-driven charges for four risk classes: asset default (C1), mortality or insurance (C2), investment mismatch (C3), and general (C4).



Stuart Silverman, FSA, CERA, MAAA, is principal & consulting actuary at Milliman Inc in New York, N.Y. He can be reached at stuart.silverman@milliman.com.

Working through the statutory reserves and RBC formulas, the insurer’s total asset requirement for the SPIA block is \$11.04 billion (Figure 2). This amount includes a capital charge for asset default and interest rate risk but no capital charge for longevity risk. This is the case even though the level of mortality improvement that occurred in the past clearly indicates that this omission is probably an oversight in the RBC formula.

ECONOMIC RESERVES AND CAPITAL

Unlike statutory reserves and capital, whose calculation relies on a formula-based approach, economic reserves and capital are determined using a principle-based approach. For this SPIA block, we defined the economic reserves to be the present value of annuity benefits and economic capital as the additional capital needed to satisfy a predetermined risk level (at CTE 90 or the 99.5th percentile) in excess of the book’s economic reserve. Under certain circumstances, margins for adverse deviation are used to determine the book’s economic reserve, but this case study instead used a best estimate of valuation.

To maintain continuity with the assumptions of the statutory capital formula, economic reserves and capital assumptions were also based on the Annuity 2000 table, but without the 10 percent discount in mortality rates (i.e., the Annuity 2000 basic table). Instead of simply multiplying the basic table mortality rates by 90 percent, which may have been conservative in 2000, we reflected both past improvement from 2000 to the valuation date and projected mortality improvement after the valuation date.

To further ensure consistency with the statutory calculations, we assumed that the assets supporting the SPIA block could earn the statutory reserve discount rate. However, to control for the asset risk, for this case study we assumed that the insurer entered into a total return swap to effectively eliminate asset-related risk at a cost of 75 basis points. Other asset-management strategies could have been used to control investment risk. However, this method allowed us to identify the economic capital associated with the longevity risk and the economic capital associated with the asset-related risk.

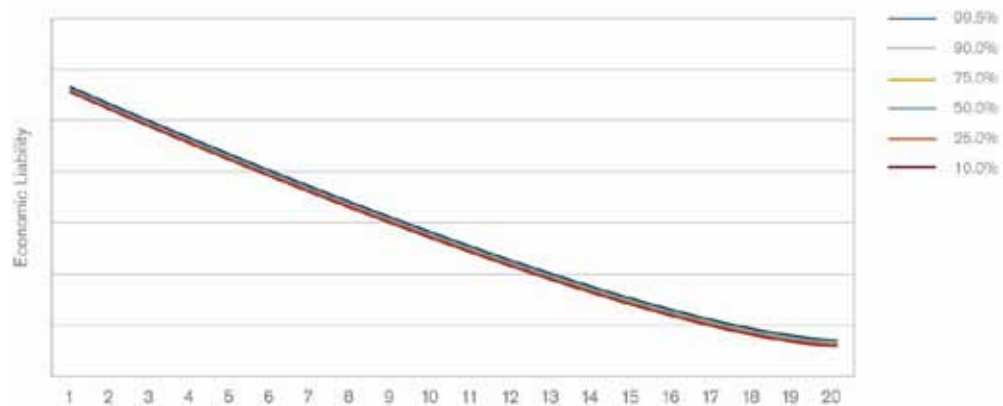
Figure 2:
Statutory Reserves and Capital (\$ in billions)

Total statutory reserve	\$10.40
CAL RBC C-1 risk, asset default	0.11
CAL RBC C-2 risk, insurance risk	0.00
CAL RBC C-3 risk, interest rate mismatch	0.05
Total CAL RBC	0.16
400% CAL RBC	0.64
Total asset requirement	\$11.04

Unlike the statutory deterministic approach, we calculated economic reserves and capital on a stochastic basis. When performing stochastic calculations, it is important to reflect volatility in all of your underlying assumptions. The graph in Figure 3 illustrates the economic liabilities from a stochastic calculation with static assumptions. Because there are a significant number of lives, the results converge to be the same as a deterministic calculation. That doesn’t mean there isn’t risk, but merely that the risk isn’t reflected in the calculation. In contrast, the graph in Figure 4 illustrates the economic liabilities from a stochastic calculation now reflecting a volatile mortality assumption. The potential dispersion of risk under dynamic assumptions is further illustrated in the graph in Figure 5, which illustrates economic liabilities at various percentiles compared to the average economic liability.

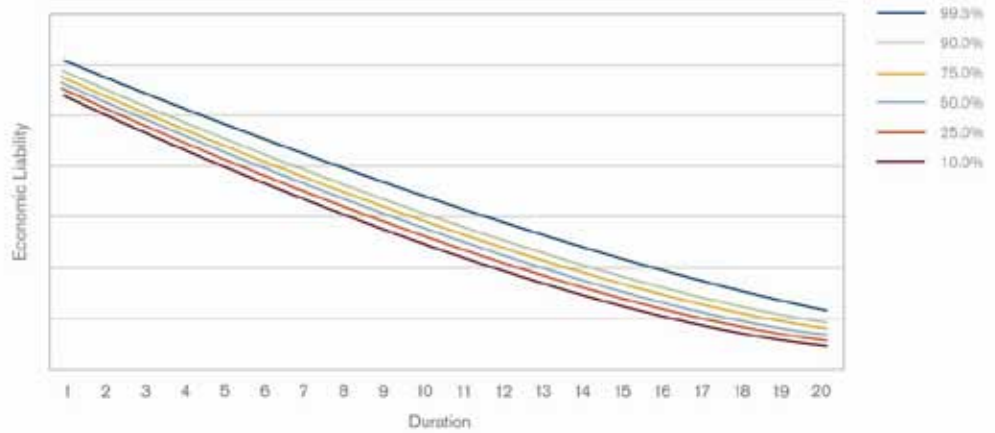
In this stochastic analysis, mortality volatility was assumed to come from several sources, including:

Figure 3:
Distribution of scenarios by economic liability at each future duration



CONTINUED ON **PAGE 22**

Figure 4:
Distribution of scenarios by economic liability at each future duration



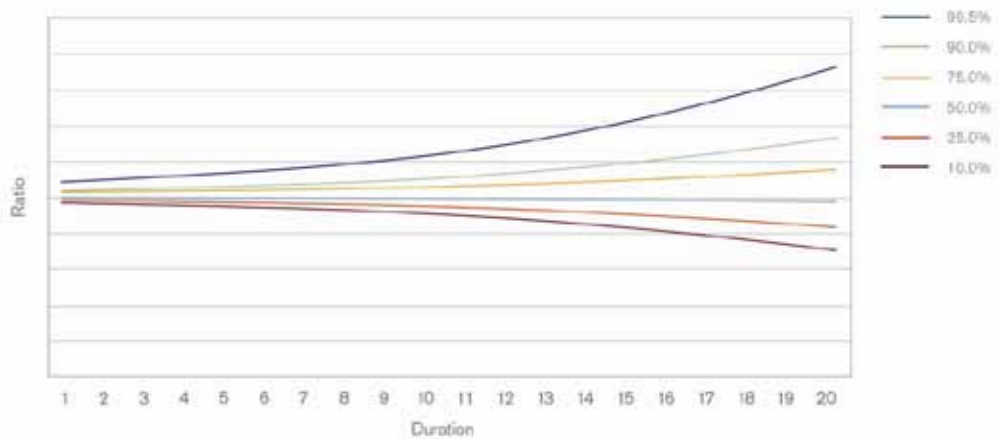
- A mismatch between the population used to generate the Annuity 2000 mortality table and the population of lives in the SPIA block.
- Volatility in future mortality improvement based on an analysis of historical levels of mortality volatility by age and gender over various time periods. Additionally, we reflected historical levels of correlation by age and genders over time periods. Then we projected volatility in future mortality improvement in manners consistent with how the factors were derived from the historical data.
- Further, our stochastic analysis reflected the possibilities of extreme longevity occurrences, such as a breakthrough in medical research.

Using the above assumptions and methodology, we focused on two economic capital measures (i.e., the 99.5th percentile and CTE 90). We calculated these capital measures at two discount rates:

- the economic liability using the 5.5 percent expected earned rate, which represents the economic capital required because of the longevity risk
- the economic liability at the 4.75 percent earned rate after entering into a total return swap rate, which represents the economic capital after reflecting longevity risk and asset risk

(Note: The economic reserve for this SPIA book is the average of all stochastic scenarios.)

Figure 5:
Ratio of scenarios economic liability to the average economic liability at each future duration



The difference in economic capital values at the two discount rates represents the capital required because of the asset risk.

The resulting value of \$10.6 billion is fairly similar to the figure produced by the statutory reserve of \$10.4 billion. To some extent this result is coincidental. This is because, at this point in time, the 10 percent reduction in mortality rates used to build conservatism in the Annuity 2000 table happens to be in line with mortality improvements that we applied to the Annuity 2000 basic table. However, if mortality improvement continues, the 10 percent reduction will become increasingly insufficient.

As shown in the table in Figure 7, the economic capital requirement for the asset risk is reasonably similar to the statutory capital requirement. However, the lack of a capital charge for longevity risk is glaringly apparent.

In fact, the main difference between the two methods can be seen in the \$83 million capital needed for longevity risk under the economic model at the 99.5th percentile (or \$55 million at the CTE 90 level) compared to no capital needed under the statutory formula. This figure is significant in itself, but it also highlights the shortcomings of using static assumptions to assess risk.

When static assumptions are used to calculate economic liabilities, the reserve results tend to converge around the mean, but if dynamic assumptions are used instead, the tail percentile values show a much wider dispersion, which enables us to have a better understanding of the risk profile.

The choice of assumptions has an impact not only on percentile values over time, but also on the average economic liability. In this case study, the average economic liability at 4.75 percent rate was calculated to be \$11.235 billion using dynamic assumptions, compared to \$11.169 billion from another stochastic analysis but in this case using static assumptions. The fact that economic liability under the dynamic assumptions is \$66 million more than that under static assumptions is no coincidence but rather reflects the asymmetry in the annuity payout patterns.

This asymmetry stems from the greater likelihood that on average more beneficiaries will live longer than expected than will die sooner than expected. Think about it. Reflecting volatility increases the range of possible values—both increasing and decreasing values. But while people can live to the end of the mortality table, they can't die before the valuation date. This phenomenon therefore increases the possibility that a beneficiary will live longer rather than die earlier, creating the asymmetry. This “cost of volatility” is not reflected in the insurer's liability unless mortality volatility is introduced into the equation.

DEAL OR NO DEAL?

The additional \$66 million is not an insignificant sum. For some investors, it might make or break a deal. But insurers, which have a mandate similar to other investors, often ignore mortality volatility in assessing their products, and thereby make themselves vulnerable to underperforming products.

Figure 6:
Economic Reserve and Capital (\$ in billions)

1	Average economic liability value (or economic reserve) discounted at 5.50%	\$10.61	
		99.5th percentile	CTE 90
2	Economic liability value discounted at 5.50%	\$11.44	\$11.17
3	Economic liability value discounted at 4.75%	\$12.18	\$11.87
	Capital for longevity risk (2) – (1)	0.83	0.55
	Capital for asset risk (3) – (2)	0.74	0.70
	Total economic capital (3) – (1)	1.57	1.26

CONTINUED ON PAGE 24

Economic Capital: ... | from Page 23

Figure 7:
Comparison of Statutory and Economic Approaches (\$ in billion)

	(1)	(2)	(3)	(4)	(5)
	Statutory	Economic 99.5 th percentile	(1)/(2)	Economic CTE 90	(1)/(4)
Reserve	\$10.40	\$10.61	98 %	\$10.61	98 %
Capital for asset risk	\$ 0.64	\$ 0.74	86 %	\$ 0.70	90 %
Capital for longevity risk	\$ 0.00	\$ 0.83	0 %	\$ 0.55	0 %
Total capital	\$ 0.64	\$ 1.57	40 %	\$ 1.25	51 %
Asset (reserve + capital)	\$11.04	\$12.18	91 %	\$11.87	93 %

A far more realistic approach is to recognize longevity risk and identify ways to reduce the capital requirements associated with it. This task is admittedly no easy matter, and options are somewhat limited.

Diversification of risk through issuing life insurance can provide some capital relief, but negatively correlated risks are rarely perfectly matched, as the 1918 pandemic demonstrated with its comparatively higher death rates among young people but lower death rates for older people (relative to expected death rates).

An insurer also may try to reduce its capital charges by demonstrating to its rating agencies its attention to capital management and the steps it is taking to manage its capital needs.

A relatively new but increasingly popular option is the securitization of longevity risk. Markets for longevity derivatives (i.e., longevity swaps or bonds), have started to materialize. These financial instruments make payments based on a survival rate over some period of time.

To see how such an instrument might reduce an insurer's capital requirements, let us consider the case of a hypothetical 10-year longevity bond with principal of \$1 billion. The bond is offered to investors with a 5.5 percent coupon, but the insurer has a 4.75 percent investment assumption, producing an annual cost of 75 basis points to the insurer. After 10 years, the principal is repaid, assum-

ing the economic liability is below the attachment point. However, if the economic liability at the end of 10 years is above the attachment point, the insurer will not need to repay some of the principal, which ultimately offsets the higher-than-expected reserves the insurer is holding. In fact, if the economic liability reaches the exhaustion point, the insurer would not need to repay any principal.

In this hypothetical example, the probability that the insurer will reach the attachment point is 4.0 percent (or 40 out of 1,000 scenarios), while the possibility of reaching the exhaustion point is 0.2 percent (or two out of 1,000 scenarios). Over the 10-year period, investors are likely to lose 1.2 percent of their principal. In 96 percent of the scenarios the result is no loss to the investor. But the average loss of the 40 attachment scenarios is \$308 million.

While this investment is an out-of-the-money risk to the investor, it can immediately reduce an insurer's economic capital. In this hypothetical example, the reduction in economic capital is as much as \$230 million at the 99.5th percentile capital measure, at which point the insurer's economic liability of \$12.18 billion before the hedge drops to \$11.95 billion after the hedge.

Other options may be available, but before an insurer starts down the capital management road, it needs to identify its sources of risk and understand their potential volatility. Without proper analysis, insurers could find themselves increasingly vulnerable to unexpected changes in mortality. Stochastic models that incorporate volatile mortality assumptions may be a useful tool to analyze this risk. ■

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1

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Risk Appetite for Variable Annuities: Managing the “Three-headed Monster” Challenging Variable Annuity Writers

By Amit Ayer

INTRODUCTION

The global financial crisis and meltdown from late 2008 to mid-2009 had a severe impact on variable annuity (VA) writers. The majority of VA writers suffered earnings and capital losses that placed them at the brink of insolvency. Due to inadequate capitalization, a number of companies had to borrow from the government or other sources to remain solvent or operational.

VA writers were faced with declining equity markets, increasing implied and realized volatility, decreasing interest rates and inadequate VA product design. These synergistic forces put a strain on capital, earnings and product profitability creating a veritable “three-headed monster” for many VA writers.



Amit Ayer, FSA, MAAA is an executive in Insurance and Actuarial Advisory Services Practice of Ernst & Young, LLP's Financial Services Office in New York, N.Y. He can be reached at 212.773.7391 or amit.ayer@ey.com.

This article focuses on how a risk appetite framework can help a company manage the “three-headed monster” and why a risk appetite framework is critical to effective business and risk management at both

the corporate and product levels.

While risk appetite is often integrated into an enterprise risk management strategy, the material and diversified exposures in VA products serve as an avenue to apply a risk appetite framework at the product level.

COMPETING OBJECTIVES OF RISK MANAGEMENT: THE “THREE-HEADED MONSTER”

The crisis proved many VA writers did not fully understand the complexity involved in managing risk embedded in VA products. They sold these products in response to increased consumer demand and corporate profitability in benign economic times. At the height of the crisis, however, VA exposures were material enough to deplete capital levels, demonstrating their materiality in relation to a company's overall exposures.

From our experience talking with VA writers, chief risk officers and heads of VA equity risk management departments in major companies, we have identified a series of

competing objectives in relation to risk management (three-headed monster):

- Reducing earnings volatility (Generally Accepted Accounting Principles)
- Reducing the required capital or required statutory reserves (Statutory)
- Maintaining economic profitability (Economic)

Here are some examples of how this “three-headed monster” is the perfect segue into risk appetite:

- Companies have different VA risk management strategies to help reduce their capital or statutory reserves. However, these may result in greater earnings volatility.
- Hedging to higher and higher order Greeks sensitivities to reduce earnings volatility may not reduce capital or statutory reserves.
- VA product profitability may be hurt by hedging strategies that only hedge to GAAP earnings volatility.

The real paradigm in the market is aiming for all three objectives simultaneously, recognizing that there are severe trade-offs. The goal for a VA risk appetite framework is to think about these three objectives and how they relate to each other, then to define a risk management strategy that incorporates all three.

THE BENEFITS OF IMPLEMENTING RISK APPETITE INTO A VA RISK FRAMEWORK AND STRATEGY

Risk appetite is often thought of at the corporate level to manage exposures at an enterprise level. However, the materiality and complexity of the inter-relationships of VA exposures provide a case study to build a risk appetite framework starting from the product level.

In addition to managing the competing objectives of the “three-headed monster,” there are five major benefits of implementing a risk appetite framework into a VA financial risk management strategy:

- **Setting risk tolerances:** a risk appetite framework requires senior management and the Board of Directors to set risk tolerances around VA products. This forces introspection around whether a company's risk appetite is in line with the VA business already in-force or currently being issued. Risk tolerances will require answer-

“Managing the competing objectives of the “three-headed monster” is a logical segue into VA risk appetite...”

ing difficult questions, such as “can the overall business absorb the capital constraints imposed by VA products” and “are the exposures from VA products in line with the company’s broader risk appetite?”

- **Reduce earnings surprises:** since VA business can be a material driver of overall company earnings, a risk appetite framework can help reduce earnings surprises to shareholders. Senior management and directors were surprised by the extent of losses in the recent crisis and the amount of risk embedded in their VA products, particularly in living or death guaranteed benefits. Building a risk appetite framework for VA can help management understand potential issues with VA business before issues arise.
- **Link management actions to risk limits:** a risk appetite that explicitly links remedial risk management actions to risk tolerances will enable a company to quantify the impact of prospective risk management actions.
- **Prospective assessment of VA risks and VA risk management strategies:** a risk appetite framework for VA should involve assessing VA exposures and risk mitigation strategies prospectively against risk tolerances. A risk appetite framework will help VA writers assess the evolution of VA risks. VA risk management strategies will evolve as state variables change in a dynamic environment. Many VA writers analyze the efficacy of VA risk management strategies retrospectively through back-testing analysis. A retrospective approach to risk management clearly failed for VA writers during the crisis. Changes were made after finding mistakes or determining that the risk management approach was ineffective.
- **Transparency:** a risk appetite creates transparency in how risks and exposures are managed by linking VA performance across a variety of metrics against risk tolerances.

A FOUR-STEP APPROACH TO ESTABLISH A VA RISK APPETITE

Outlined below is a four-step approach to implement a formal risk appetite framework for VAs:



Step 1: Define the risk appetite objective

It can be challenging to define the objective since the level of VA exposure differs from one company to another. For example, the VA concentration risk for a large firm may be less than for a smaller writer. Different types of VA products across companies have varying degrees of sensitivity to changing market conditions.

Defining the risk appetite objective first requires understanding the relative size of the risk or what portion of the total company exposure is related to VA. Variable annuities are only one product, but in terms of capital or earnings volatility, they represent a much larger exposure than more traditional life insurance products. In this step, an analysis of a company’s enterprise risk appetite objectives require a thorough review to ensure that both the VA and enterprise risk appetite frameworks are fully integrated.

Second, it is important to perform a more granular analysis of the VA product mix, including the benefits offered and risk management strategies to cover those benefits. Certain VA exposures could be more material depending on the product, capital and market mix.

Step 2: Identification of VA risk tolerances

This step involves defining the major risk exposures across VA products, which may create more issues for some companies than others. For example, certain companies have been willing to take on greater equity risk or

CONTINUED ON PAGE 28

are open to more volatility in interest rate risk. For each material risk, alert and risk limit levels can be defined. Two levels for each material VA risk exposure should be defined to provide levels of remedial management action.

Step 3: Defining stress levels

After these VA risk tolerances across each material exposure are defined, stress levels across each exposure can be calibrated using statistical analysis and a blend of managerial discretion. By stressing VA policies across a variety of actuarial and economic scenarios, the competing objectives of managing earnings, statutory capital and product profitability can be assessed in a stressed environment.

Step 4: Assessing VA exposures and linking risk management actions

VA exposures are analyzed under various stress levels and compared against risk tolerances identified in Step 2 across each material risk exposure. The exposures are modeled using a “what if” analysis, with hedge simulations projected in the future and hedge strategies overlaid. If certain exposures breach the risk tolerances identified, then prospective management action can be taken before problems arise.

Using this risk appetite framework, companies can avoid the missteps in VA risk management that were evident during the crisis. Economic market conditions have been a catalyst for the need to improve transparency between the strategic objectives and VA risk management actions taken to achieve these goals.

The success of a risk appetite framework for VA depends on direct linkage to the enterprise risk appetite. It cannot be viewed in a vacuum, but must filter down from the enterprise risk appetite and be applied to products in a more quantitative and risk-focused way. Linking a VA risk appetite framework to the enterprise risk appetite framework ensures that the product level risk appetite is defined in a context that is appropriate for a company as a whole.

The prospective approach to identifying future risk management actions is a key attribute of an effective risk appetite for VA. A facet of VA risk appetite that should be found in enterprise risk appetite frameworks includes performing advanced projections to simulate “what if” analysis across a variety of hedging strategies and product development designs ; and to assess the “three-headed monster” under a variety of stress scenarios to link directly to risk management action. A VA risk appetite framework needs to be robust because of an advanced modeling requirement and integration of advanced risk modeling to management action. A risk appetite is not simply another tool in the arsenal of risk management. It is the tool that every company needs in its inventory.

The views expressed herein are those of the author and do not necessarily reflect the views of Ernst & Young LLP. ■

Oops! Unintended Consequences of Fixing Financial Regulation

By Max J. Rudolph

FINANCIAL REGULATION CYCLES OVER MANY YEARS, ALTERNATING BETWEEN PERIODS OF LENIENCY AND TIGHT CONTROLS. In Summer 2010, as the Wall Street Reform and Consumer Protection Act (also known as Dodd-Frank for Senator Christopher Dodd and Representative Barney Frank) was signed into law, the world has clearly moved from an era of increasingly self-regulation and laissez faire economic principles toward a more highly regulated environment. Regulation is a lagging indicator, traveling to politically induced extremes before being pulled back toward the center as conditions change.

WHAT CAUSED THE FINANCIAL CRISIS

The recent financial crisis will be studied to death in the future, but the primary drivers can be captured in a few broad categories.

- **Culture:** Firms, individuals and regulators all believed they understood the risks accepted. Skeptical voices with contrarian thoughts were shut out of the conversation.
- **Accountability:** Investors outsourced their due diligence responsibility.
- **Incentives:** Financial incentives encouraged mortgage originators to sell, investment banks to securitize and regulators to defer to internal models.
- **Exposures:** Assumed diversification benefits were proven incorrect as tail risks occurred.
- **Leverage:** Entities that borrow are forced to sell when markets move against them.
- **Systemic risk:** When markets are stressed there are no buyers and a liquidity crisis puts the entire financial system at risk.

It is impossible to predict which specific risk will create a crisis, but a leading indicator always seems to be someone saying “It’s different this time.” Risk models that use only historical data are not flexible enough to adjust. A successful financial system will work in concert with the regulatory framework to set up a fair and transparent market where those interested in reducing their risk find someone willing to be paid to accept the risk.

By allowing firms to fail it encourages them to experiment. If firms are too big to fail, resources are diverted to lobbying to maintain the moat and increase barriers to entry. Creative destruction might seem like an oxymoron, but it is necessary for capitalism to thrive. There must be oversight that kicks in when products become overly popular, both internally at companies and within the industry.



Max J. Rudolph, FSA, CFA, CERA, MAAA, founded Rudolph Financial Consulting, LLC in 2006. He can be reached at max.rudolph@rudolphfinancialconsulting.com.

By 2006 banks were focused on growth with limited risk analysis or due diligence, individuals were spending beyond their means, and government provided incentives for home ownership through low interest rates and loose credit standards. Reduced oversight created a perception that Government Sponsored Entities and large banks were “too big to fail,” encouraging the cycle to continue. This combination of risks caused the system to freeze up when defaults rose above expectations.

NEEDED: CONFIDENCE IN THE SYSTEM

Regulation of the financial services industry should cast a broad net so no risk falls through the net. Its main job is to create confidence in the system itself. When confidence leaves the market, liquidity dries up and the market can’t operate efficiently. Everything else it does supports this overriding fact. Transparency, peer review, and maintaining a fair marketplace are key components of this strategy. The Dodd-Frank bill will set the tone of the regulatory environment for years to come. There are many things right about the new regulatory framework, but there are potentially unintended consequences as well. Some that could reduce confidence in the system are described below.

- **Proprietary trading:** The so-called Volcker rule does not clearly define proprietary trading, allows banks to manage assets while using performance-driven compensation and does not limit the leveraged position of

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assets purchased within the 3 percent limit. Creative bankers will evade the spirit of this regulation if yet-to-be written rules don't tighten constraints.

- **Regulatory arbitrage:** Transparency should improve with standardized derivative products on an exchange, but regulatory arbitrage will still allow creative products to flow to the loosest regulator as happened with credit default swaps. Principle-based capital requirements calculated at the holding company level, and auditors with teeth, are needed to avoid a repeat with a different complex security. Coordination between regulators through a patchwork that focuses on only one part of the financial services market (e.g., banks, insurers, securities) will each have conflicting motivations. Consistently strong regulation is unlikely to result.
- **Systemic risk:** The Financial Stability Oversight Council (FSOC) will struggle to effectively manage systemic risk due to its politically based reporting structure. With the chair being the Secretary of the Treasury politics will be high on the agenda. The FSOC also does not address the "enablers" that bought the assets without proper due diligence. Just as drug dealers would not exist if there were not drug users, suppliers of financial instruments have no market without buyers. The legislation does not address future systemic risks that are not purely financial. Examples include pandemics, natural disasters or technology gone wild. Interactions between risks, including funding sources, should be measured quantitatively and questioned qualitatively. When multi-line companies have few insiders who really understand how a multitude of risks interact, how can we expect regulators to do any better? Will the new "super regulator" for systemically important firms be up to the challenge? And if they are, why continue to support other, now redundant, bureaucracies?
- **International cooperation:** The Office of National Insurance will be formed to provide a unified front internationally. How this group will interact with the NAIC is not clear. Each group is incented not to work with the other from the start as a form of self preservation. If there is over-regulation then risks will move offshore, much like the XXX reinsurance market has. While some have suggested that the ONI have an Office of the Actuary, a better place for this role is

beneath the FSOC so as to address risks in all types of financial institutions.

- **Lobbying:** Regulators and Congressmen get much cozier with industry when lobbyists are involved. One suggestion would be for lobbying arms of companies accepting government aid to be greatly reduced or eliminated. The major risk in this legislation is that the lobbyists will drive the remaining bureaucratic rules making, leaving holes and arbitrage opportunities throughout.

MOVING FORWARD

There is no shortage of guilty parties that helped to create the recent financial crisis. Everyone played a part. Individuals took on risks they had little chance of surviving financially, financial institutions became originators and/or enablers accepting the ultimate risk positions, and regulators and rating agencies provided the alcohol at the party when their job was to take the punch bowl away.

A complete list of systemic risks is impossible to create, but an attempt must be made at the federal level to continually update the list and not give in to political pressures. A systemic risk regulator must be independent of the political process, with offices throughout the country to better understand regionally important issues. Emerging risks should be considered, utilizing experts to identify, coordinate, and develop a game plan to address them. A national chief risk officer, with staff, would improve coordination across and between risk silos.

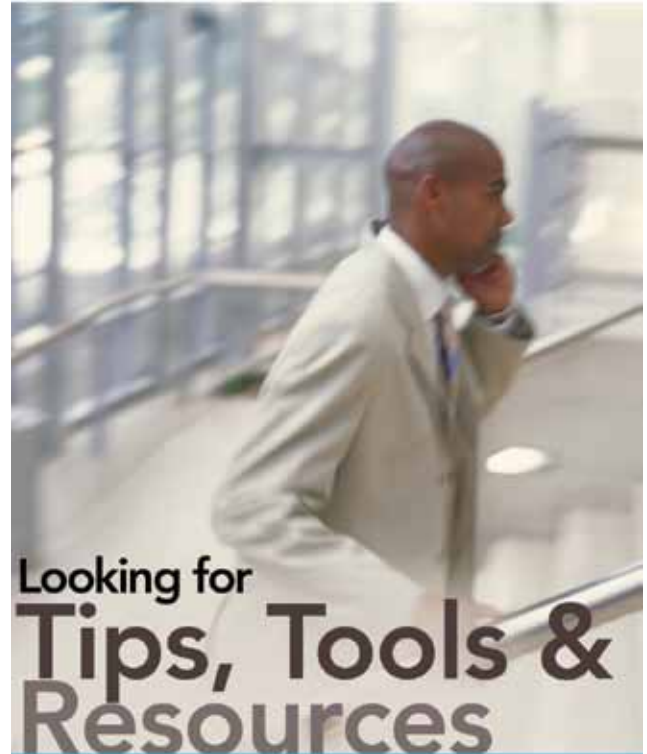
The insurance industry is currently performing a live case study of regulatory reform as the NAIC implements its program for risk-focused examinations. Unfortunately there has been wide variation in the way states are performing these exams. They have tended to be audit based and not the forward-thinking partnership they could become. RFEs should focus as much on risks likely to increase in future audits, bringing in outside risk experts to do this, rather than trying to have internal staff competent in audit work evolve into risk managers through a few hours of training. It is a different skill set. This will hurt the NAIC's efforts to remain the primary insurance regulator if they do not anticipate the next big risk.

Financial institutions must continue to develop their enterprise risk management process. Those who do it well will have a competitive advantage. By identifying their unique risks and consciously choosing the ones they accept based on consistent analysis, a strategic planning process will evolve and improve over time. This will help firms manage their risks, mitigating or avoiding specific risks by choice.

Financial institution regulators need to consider emerging risks and build scenarios that show how they might interact with the current financial system. The focus on developing such a framework should be on the skill set needed rather than on industry. This group should be comfortable with numbers and projections, with a healthy skepticism for what others are saying. This group should be involved in regulation of all financial institutions, from credit cards to insurance to investment banks. A single profession does not own these risks, and all professionals with standards and professionalism requirements should be allowed to participate. Actuaries create models that consider potential events and challenge those same models with common sense. This helps the profession provide honest feedback around work done by others with credibility based on mathematical knowledge and experience in the financial space. Many actuaries are also forward thinkers and can help develop solutions that consider emerging risks. The actuarial profession should be included in this risk management regulatory group, and some actuaries will have the experience and communications skills to lead such a team.

All regulation has unintended consequences. To be sure, creative products are already on the drawing board designed around the new regulatory framework. How will this change the financial landscape? Will it be as drastic a change as the last time regulations tightened in the 1930s, or did a culture shift drive most of those changes? Only when individuals pay the final bill of the recent crisis will we know the answer to that. With interest rates held low and deficit spending ingrained in entitlement programs and bailouts, it is likely that there will be more bumps in the road before smooth sailing returns. ■

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