

# Risk Management:

The Current Financial Crisis, Lessons Learned and Future Implications

## Introduction

The current financial crisis presents a case study of a “financial tsunami” (as former Federal Reserve Chairman Alan Greenspan recently called it) on what can go wrong. Its ramifications are far-reaching and the lessons learned will be embedded in risk management practices for years to come. As one of the premier enterprise risk professions in practice today, the actuarial profession is sharing its substantial insight into what went wrong and the implications for the future.

On behalf of the Society of Actuaries, the Casualty Actuarial Society and the Canadian Institute of Actuaries, we are pleased to provide a series of essays on **Risk Management: The Current Financial Crisis, Lessons Learned and Future Implications**. This e-book is the result of a call for essays on the subject coordinated by the following groups:

- The Joint Risk Management Section of the Society of Actuaries, Casualty Actuarial Society and Canadian Institute of Actuaries
- The Investment Section of the Society of Actuaries
- International Network of Actuarial Risk Managers
- Enterprise Risk Management Institute International

Included in this are the opinions of a number of authors written in response to our call for essays. An essay is, essentially, a short non-fiction form of writing expressing the often subjective opinion of the author.

The thoughts and insights shared herein are not necessarily those of the Society of Actuaries, the Casualty Actuarial Society, the Canadian Institute of Actuaries, or the authors’ employers.

We hope these essays will provide thought-provoking discussion and commentary in the months and years to come.

Sincerely,

**Don Mango, FCAS, ASA, CERA, MAAA**  
*Chair*

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## The Essays

### EXPLANATIONS, CAUSES AND CURES

These essays address the philosophies and origins of how the crisis began, with anecdotes about what has happened and insight into encouraging thought leadership going forward.

- The Causes and Cures of the Financial Crisis by *Ira Robbin*
- The Upside of a Downturn by *Krzysztof Ostaszewski*
- Bubbles, Cycles and Insurers' ERM – What Just Happened? by *Paul Kneuer*
- Our Titanic Crisis: An Economic Rescue Plan by *Bertram Horowitz*
- It is Time to Decide What Kind of Crises We Want to Have in the Future by *Ioannis Chatzivasiloglou and Charalampos Fytros*
- The Financial Crises: A Ripple Effect of Incentivised Disorder by *Paul Conlin*

### PRUDENT ENTERPRISE RISK MANAGEMENT STRATEGIES

Some discussion of the crisis has reflected on the perceived failure of enterprise risk management. The consensus of these authors is that the crisis is not a result of a failure of the enterprise risk management process, per se, but rather a failure to implement enterprise risk management processes at all. These authors point out that the key to prudent enterprise risk management is in the enactment of a corporate culture that aligns desired performance with incentives and the matching of the authority to make decisions with accountability for the decisions made. Currently, most incentive compensation rewards returns, but without reflecting the risk undertaken to achieve the returns.

#### Culture

- Your Mother Should Know by *David Ingram*
- Mixed Risk Management Strategies – Diversification That You Can Count On by *Wendy Yu*
- Derivatives, AIG and the Future of Enterprise Risk Management by *Michael G. Wacek*
- The Democratization of Risk Management by *Michael C. Schmitz and Susan J. Forray*
- Should You Have a Chief Skeptical Officer? by *Max Rudolph*
- Lessons from the Financial Crisis for Directors and CEOs of Insurance Companies® by *Jean-Pierre Berliet*
- Against the Grain: The Wisdom of Countercyclical Capital by *Anson J. Glacy, Jr.*

#### Aligning Incentives

- Reaffirming Your Company's Commitment to ERM in Light of the Financial Crisis by *Prakash Shimpi*
- A Tale of Improperly Placed Incentives by *Sam Gutterman*
- Risk Management: The Current Financial Crisis, Lessons Learned and Future Implications by *Neil Bodoff*

#### Managing/Matching Authority and Accountability

- Recent Crisis: Roots and Lessons by *Stephen Mitchell and John F. McGarry*
- There Is No Free Lunch by *Daniel C.F. Hui*
- Risk Management – Buyer Beware! by *Dennis Barry*
- Risk Management and the Financial Crisis: Why Weren't We Protected? by *Mike Batty*

#### Managing Liquidity

- Modeling and Managing Liquidity Risk by *Gary G. Venter*

## SOCIETAL THEMES

These essays center on the behavior of society and provide interesting and thought-provoking commentary on the interconnectivity of individuals' behavior with the resultant behavior and roles of the markets, regulation and the inherent responsibilities to society. Given the existing limited liability laws, the role of regulation, and imperfect (and at times) "wild" interconnected and correlated markets, how and where does society put the costs and responsibilities of such a crisis?

### Limited Liability Laws

- *An Ideal Crisis by Shane Whelan*

### Markets: Regulation Of, Efficiency Of, Interconnectivity Of

- *Transparency and Liability Valuation by Philip E. Heckman*
- *Creating an Exchange for Insurance Contracts by Oakley E. (Lee) Van Slyke*
- *The Game of 'Pass the Risk': Then and Now by Joy A. Schwartzman*
- *From Liquidity Crisis to Correlation Crisis, and the Need for 'Quants' in ERM by Stéphane Loisel*

### Behavioral/Personal Economics

- *Essay on the Financial Crisis by Andrew Winkler*
- *The Human Touch Underlying the Current Financial Crisis by Vivek Gupta*
- *If It Looks Too Good to Be True ... by Steve Malerich*

## EFFECTIVE RISK MODELING

These essays cover the reliance and overreliance on models. Models that tend to break down under 'crisis mode' and society's reactions are discussed. Efficient models must reflect correlation and the domino effect that can occur when bad things happen.

- *Credit Crisis Lessons for Modelers by Parr Schoolman*
- *What Is a Robust Level of Risk Capital? by Larry Rubin and Xiaokai (Victor) Shi*

## INSIGHTS FROM THE INSURANCE INDUSTRY

The actuarial profession has served as the enterprise risk management backbone of the insurance industry over the centuries. The authors of these essays share their insight on what has worked and what has not in the insurance industry and suggest how these learnings could be applied to other industry sectors in terms of analytical tools, regulation, contractual obligations and prudent risk trading schemes.

- *Seven Simple Lessons from Two Actuaries on the Mortgage Crisis by Randy Roth and John Pierce*
- *An Industry in Question, a Profession with Answers by James Ramenda*
- *The Financial Crisis: An Actuary's View by Louise Francis*
- *Actuaries Would Have Made a Difference by W. James MacGinnitie*

## Explanations, Causes, Cures:

The Causes and Cures of the Financial Crisis

BY IRA ROBBIN

The Upside of a Downturn

BY KRZYSZTOF OSTASZEWSKI

Bubbles, Cycles and Insurers' ERM – What Just Happened?

BY PAUL KNEUER

Our Titanic Crisis: An Economic Rescue Plan

BY BERTRAM HOROWITZ

It is Time to Decide What Kind of Crises We Want to Have in the Future

BY IOANNIS CHATZIVASIOGLOU AND CHARALAMPOS FYTROS

The Financial Crises: A Ripple Effect of Incentivised Disorder

BY PAUL CONLIN

## The Causes and Cures of the Financial Crisis

by *Ira Robbin*

Why are we in a financial crisis and how do we get out of it?

The “why” can be simply explained: there is little confidence in balance sheet valuations because too many assets are overstated, too many liabilities are understated, and too much information is hidden. The crisis has spread due to a systematic failure of the regulatory system. Over the last 20 years regulations that fostered market stability were eliminated, and new financial instruments were allowed to propagate without any real oversight.

The history of markets is one of booms and busts. The volatility of the cycles is magnified by leverage and tempered by transparency. The development of new financial instruments set the stage for this crisis because they were effective at pumping up the amount of leverage and masking the magnitude of risk in the system. A telling symptom of the crisis is that leaders of many institutions claim to be surprised at the amount of risk their firms were exposed to: they did not know they were placing large bets in the financial casino.

It is important to disentangle the initiatives that have been made and to understand which have worked and which have not. First consider the bailouts. These have been proffered to a select group of financial institutions whose collapse was feared to imperil the overall workings of the world financial system. The cost of bailouts has been enormous and threatens to grow even larger. The arbitrary way bailouts have been implemented in the financial sector presages a possible expansion of bailouts to many sectors of the economy, with political pull and not financial efficacy being the ultimate determinant of who gets bailed out and who does not. Despite tremendous cost, the program of arbitrary bailouts of financial firms has not been effective. While it has forestalled immediate crises and saved some firms from imminent collapse, it has not pulled the economy out of the larger crisis.

What have been successful are efforts central bankers have made to stop runs on the banks. By extending insurance for bank deposits before a general panic could commence,

government bankers have instilled enough confidence in the system that people have, by and large, not felt the need to withdraw their funds and hide their savings under mattresses.

Central banks have made efforts to ensure liquidity, and they have applied doses of monetary stimulus. They have reduced interest rates and pumped money into the system. However, these stimuli have not yet proved effective at reversing the downturn. Why not? The problem is two-fold. On the one hand, even with money readily available at low rates, bankers are hesitant to lend to questionable borrowers, and more and more borrowers are becoming questionable each day. On the other hand, overextended consumers are not clamoring to borrow money. They are frightened as their 401ks plummet and the equity in their homes shrinks toward zero. The financial crisis has sparked a general recession in the larger economy. Until demand recovers, firms in many sectors have little need to borrow to finance expansion of plant and equipment. To summarize, monetary stimuli alone are insufficient to revive demand.

How do we get out of this crisis? If our diagnosis of “why” is correct, and if our assessment of measures undertaken to date is accurate, then it becomes clear that a solution to our economic woes must be focused on two major objectives. First, all reasonable measures must be taken to stabilize and restore demand. Fiscal stimulus ought to be applied vigorously to do this. The federal government should send money to state and local governments in order to keep police, firefighters, schoolteachers and librarians in their jobs. It should increase the size of the armed forces. It should provide seed money to finance an accelerated schedule of highway and bridge construction, port improvements and alternative energy investments. It should loan money to auto manufacturers and other industrial firms that employ large numbers of people. Unemployment insurance should be extended even further. Anything that has a multiplier effect that will foster demand and keep unemployment down should be considered.

The Causes and Cures of the Financial Crisis by Ira Robbin

The second major objective is force an accurate, if not conservative, revaluation of all balance sheets and to impose strong capital requirements on financial institutions. To do this will likely cause many large firms to fail. But that is what is needed. Credit will begin to flow once all players are sure of the net worth of others in the market.

The federal government should stop bailing out financial firms. That is throwing good money after bad. It should definitely not be taking an equity stake in them. This confuses the market about the net worth of the firms: are they implicitly backed by the government? It also undermines the value of other financial firms that do not have government backing.

Part of the process of ensuring adequate valuations is to impose stringent regulations and capital requirements on whole classes of new financial instruments. Any recent financial mechanism that appears to mask risk or increase leverage should be subject to such treatment. In effect, all the leverage and hidden risk needs to be unwound, before we can reach the floor and start the way back up on a sound and sustainable basis.

The philosophy inherent in the regulation of property and casualty insurance companies provides an interesting paradigm for how a wholesale revaluation could be accomplished without mortally wounding the whole economy. When an insurance company has inadequate capital, it is subject to seizure by state regulators even though it is technically not bankrupt. The state authority stops the company from writing any more business and then proceeds to liquidate it. This stops the company from trying to raise cash by writing a boatload of underpriced business. Meanwhile the claimants are not left with worthless paper; instead they are partly compensated by guaranty funds. These funds are partially replenished by recoveries from the liquidation. A variant of this idea is when the existing company is split

into a New Company that writes new business and an Old Company that is liquidated.

The liquidation and guaranty fund approach provides a way out of the crisis. The government should seize weak financial companies and liquidate them. It should act as a partial guarantor of some of their financial instrument obligations, paying them off at 50 percent or some other set rate. The choice of which instruments should be partially honored needs to be thought through. Overall, instead of investing in AIG, lending money to AIG, and paying off its credit default swaps at 100 percent, the government should put padlocks on its doors, liquidate it, pay off regular insurance contracts according to existing state guaranty fund rules, and guarantee to make good on 50 percent of its financial insurance obligations. This could be coordinated with foreign governments so policyholders and counterparties the world over would be treated to the same degree of painful but not fatal fallout.

For another example, Fannie Mae and Freddie Mac should be split into old and new companies. The old ones should be liquidated, and the new ones should be forced to operate under stringent lending rules. The same approaches can be used all the way through the nested chains of tranches and derivative instruments that wind through the economy. It will be very costly, but, in the end, it will cost far less than trying to revive a select few of the comatose and pay off 100 percent of their ill-considered financial obligations.

In conclusion, what is being called for here is not more of the same. Instead of bailing out weak financial firms, we should be liquidating them. All doubtful assets need to be written-downs; the sooner the better. We need accurate and transparent accounting. Government can help in this effort to clean up our accounting system. But it needs to stop being an investor propping up those that should be in the morgue. It needs to conservatively regulate all financial instruments. It should foster liquidity and stoke demand. That is what needs to be done to get out of this crisis.

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## The Upside of a Downturn

by Krzysztof Ostaszewski

The financial crisis that began in 2007 and accelerated greatly in 2008 has posed a unique challenge for the regulators of financial intermediaries. The speed and severity of the events that transpired have been quite a shock to the financial and political system in the United States, and subsequently, worldwide.

This crisis has posed a unique challenge for regulators. And, it has brought to the forefront the following key question: What should regulators do with an impaired financial institution?

This crisis is the first crisis of the new financial services industry, an industry created by the Gramm-Leach-Bliley Financial Services Modernization Act of 1999, which opened up competition among banks, securities companies and insurance companies. Yet while the industry has become integrated, its regulation has remained fractioned. When banks are impaired, their problems are addressed by the Federal Reserve and FDIC, while insurance companies face state insurance regulators; exchanges are supervised by SEC and CFTC; and independent investment banks as well as hedge funds remained largely unregulated. In response to a systemic crisis, the U.S. government has worked on crafting an integrated response, and has crossed some of the boundaries between separate parts of the industry. But those boundaries had been breached by the industry itself quite some time ago.

Different regulators have had different responses to firms under their supervision becoming impaired. The FDIC has consistently pursued the strategy of taking over banks found to be too weak to continue functioning and arranging a purchase by another bank, without any interruption in services provided to customers. The Federal Reserve has offered unprecedented liquidity, expanding it to all financial institutions and even non-financial firms. State insurance regulators remained mostly uninvolved, because the only major impairment of an insurance firm, AIG, was addressed in a very unorthodox fashion by federal

authorities, who, ostensibly, do not regulate insurance firms. At the same time, an unregulated investment bank, Lehman Brothers, was allowed to fail. I should add, however, that the phrase “allowed to fail” seems quite inappropriate, as there was no federal or state authority whose job it was to save Lehman Brothers.

The federal government’s response to the financial and economic downturn has consisted of several phases:

1. Economic stimulus checks sent to American taxpayers in early 2008.
2. The initial “bailout” proposal: to buy currently non-performing mortgage-based assets from banks and financial institutions, touted very loudly by many in the investment industry as a “great trade,” on which the government would eventually make trillions, by spending approximately \$700 billion now.
3. Capital injection for banks in the form of purchase of partial ownership in banks by the federal government.
4. Assuming full control in some failed banks, notably AIG Insurance, in order to transfer their full or partial ownership to some other, better performing financial institution.

As I am writing these words, it appears quite clear that the first step was ineffective in stemming this financial storm. Also, the secretary of the treasury has just announced abandonment of the second step (known as Troubled Assets Relief Program). Only steps 3 and 4 are being implemented. They are similar, yet subtly different. They both involve a transfer of ownership of an impaired financial institution to the regulators, but step 4 causes that ownership to be transferred fully. This has significant consequences. As we know from the careful reading of the Modigliani-Miller Theorem, a change in the capital structure of a firm has no effect on the value of the firm, unless it affects the productive capacity of the firm, its tax expenses, its bankruptcy cost, or the agency cost of that capital

The Upside of a Downturn *by Krzysztof Ostaszewski*

structure. The government is attempting to lower the cost of bankruptcy by lowering its probability. But other, maybe unintended, consequences of government actions ought to be considered:

1. As the permanent income hypothesis tells us, a one-time grant of money from the government, provided in step 1, was unlikely to cause any permanent change in the behavior of all economic decision makers. Given the likely long-term damage of the crisis, economic decision makers acted wisely by ignoring stimulus checks. The government could have been even wiser by not sending the checks in the first place.
2. The question of why financial firms are so uninterested in selling their troubled assets is quite fascinating. I would venture the hypothesis that a firm known to the market as selling their troubled assets is automatically a target of negative rumors, and, in the current fragile state of the markets, that is a very uncomfortable position in which to be.
3. Providing funds for banks without any conditions on restructuring and improving their profitability creates rather wicked incentives. If the bank is reasonably stable after capital injection, but not yet strong, the best course of action is to purchase a better performing rival, and improve its own profitability with the rival's profits. The result is that a better-managed company is acquired by a company managed badly, and good managers are let go. Bad managers have their jobs saved by taxpayers. Things are even worse if the bank is really on the brink. In this situation the smartest strategy for the managers is to pay themselves large bonuses before the inevitable end happens. And the government conveniently provided the funds.

This brings us to the fourth, least pleasant, it seems, resolution of a situation of an impaired financial intermediary: the takeover by the regulators. Or is this really such an unpleasant resolution?

A financial intermediary performs two key functions in the economy:

- Uses funds obtained from clients to purchase capital assets. This activity is, effectively, equivalent to writing derivative securities. Cash flows of an intermediary's assets are used to make payments on liabilities issued to customers. Customers' deposits or insurance policies are, effectively, derivative securities created out of the firm's assets. This activity, often misrepresented as spread business, is **very** risky, very complex mathematically and virtually never taught this way in business schools.
- Processes payments for customers. This function used to be simple and mostly banking-like. It has become more complicated with the advent of private transactions that also amount to payment processing, especially swaps of all types, that are done outside of the regulated banking system.

The first function is speculative. If a firm fails at it, it loses capital, and may need to be taken over by regulators. But failure is the firm's own problem. Failure at the second function means that the firm's customers are unable to pay their bills, resulting in a systemic economic crisis. We live in a world in which those two functions are automatically combined. Yet it is the first function, the risky one, that creates the most profits, especially with an assumption of additional leverage. Failure impairs the second function, without which economic activity stops.

We do not need to sacrifice the entire government budget, and the country's economy, to save badly managed financial intermediaries. We merely need to make certain that their customers can pay their bills. If a financial intermediary fails, its managers who did not know how to manage the derivative securities portfolio they created lose their jobs. If the regulators assure continuity of payment processing functions, such failure can and should be viewed as entirely desirable and a positive outcome. When a firm fails in

*The Upside of a Downturn* by Krzysztof Ostaszewski

the free market system, its employees and its resources can be utilized productively by other firms, but its managers proved themselves to be incapable. Keeping them in place means that their management policies will continue and the impairment they brought about will become even bigger. The upside of the downturn is that these powerful, influential, connected and important, yet incompetent people can be removed from their positions. To quote a great insight of Ayn Rand: "There is no substitute for competence." Not even \$700 billion of taxpayers' money will do.

Granted, this current crisis has its roots in an utterly irresponsible behavior of politicians who envisioned granting credit to everyone and pushed hard for it. We cannot remove or punish those politicians through economic mechanisms. The whole country is punished instead. But we must allow the return of competence in the financial industry, if we are to have one.

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## Bubbles, Cycles and Insurers' ERM – What Just Happened?

by Paul Kneuer

Interest rates rose from 2004 through 2007, so adjustable mortgage rates increased and many borrowers fell behind. After home prices topped out in 2006, speculators and some buyers who had overstretched found it impossible to refinance. This caused mortgage insurance claims.

Collateralized debt obligations (CDOs) rapidly lost value. Under mark-to-market accounting, many insurers must immediately reflect the lower values. Some CDOs were backed by guaranty insurers, who took large losses as prices fell. Others were backed by credit default swaps.

CDO pools had not been recorded on the balance sheets of the sponsoring banks, as they thought the credit risk had been passed to others. However, the banks often retained liquidity commitments, and when these were drawn down, they were required to consolidate the CDOs onto their balance sheets. This increased their assets and reported leverage, and further stressed their capital levels. Higher leverage contributed to a fatal bank run at Bear Stearns on March 17. FNMA (Fannie Mae) and FHLMC (Freddie Mac) were chartered by Congress to deepen the market in residential mortgages. They also acted as hedge funds with large positions in CDOs, which wiped out their capital bases. They were put under federal conservatorship on September 7. Many insurers held significant positions and took large capital losses.

By the third quarter, credit problems were seen as affecting all major banks and many insurers, especially ones who sold annuities with guaranteed benefits. No institution trusted another's balance sheet, and so bank investments became increasingly expensive. This made it impossible to survive other bank runs and caused the failure or forced sales of Lehman Brothers (September 15), Washington Mutual (September 26), Fortis (September 28), Wachovia (September 29) and many others. These failures cost commercial paper investors large losses, and dried up that market and the money market funds, which invested heavily in it. Insurers have large exposure to Lehman and Fannie Mae in

particular, but also to other failed firms. Falling stock and bond prices also caused insurers unrealized capital losses.

At the same time, Lehman's and others' failures and falling prices for CDOs caused losses on credit default swaps. The losses and collateral calls impaired AIG's capital, leaving them little time or flexibility to raise more, and requiring federal help.

The write-downs at U.S. public companies are now approximately \$1 trillion. In context:

- \$1 trillion is the worldwide annual P&C insurance premium, or the reinsurance industry's total assets.
- \$1 trillion averages to about a month's income per U.S. worker. This is equivalent to each of us delaying retirement by a month or two.
- The 1990 S&L crisis cost over \$150 billion and represented 3 percent of GDP. In today's \$14 trillion economy, \$1 trillion is relatively bigger, at about 7 percent. A \$600 billion problem in mortgages alone would be comparable to the S&L's and is about 4 percent. 1990 followed the 1987 crash, Latin debt problems of the '80s and two oil shocks. We are better prepared now than we were then.

### What Have We Learned?

Insurers may want to study others' missteps. A common observation is that institutions are moving toward a "supermarket" approach. Bear Stearns, Lehman and Merrill Lynch didn't have both commercial and investment banking, while Citigroup did and survived; Bank of America was the rescuer of Merrill; and Goldman Sachs and Morgan Stanley reorganized as commercial banks. The common observation may be wrong.

Diversification is a strength in times of stress, but another lesson is that commercial banks and insurers are more tightly regulated than investment banks. The insurers who had direct losses (AIG, Swiss Re and XL) sustained them in operations they saw as diversifications. Their core

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businesses kept strength and value. While successful diversification reduces risk by reducing correlation, it is hard to know what areas are correlated when. In times of great stress, new correlations appear. Diversification brings in new operational and execution risks. Vertical integration isn't diversification.

The banks that failed tended to have higher leverage ratios, and thus, less flexibility. While banks have higher leverage than insurers (as high as 30- or 40-to-1, measured as assets to equity), leverage still matters for P&C insurers. AIG was over 13-to-1 in January; 5-to-1 is a more typical ratio. Insurers also take leveraged positions on the amount of coverage they provide. Line limits and aggregate accumulations are two ways to look at this. Investment banks had CDO positions that were multiples of their capital. AIG did the same with credit swaps (\$450 billion in limits on \$70 billion of capital, over 6x). Leverage (in assets or premiums) can quickly turn from a financial advantage to a survival threat, even if it has been built up gradually. Objective measures of leverage are at least as important as stochastic estimates of impairments.

Small premiums can bring big risks. Insurers need to see and understand the potential downside on all of the risks that they take, even in small operations. AIG never had as much as 1 percent of its revenue from swaps, yet it cost them their company.

#### Bubbles and ERM

We just saw classic, but particularly severe, bubbles in home prices and debt securities. During a bubble, the buyers, sellers, investors and lenders of an asset class all develop an elevated view of values, based on observing each others' actions. Other recent bubbles involved technology stocks in the 1990s and commercial real estate in the 1980s. The debts of several emerging markets and various commodities (most recently oil) have also had bubbles, as have had several insurance products. In insurance, however, the costs and risks are born by sellers not buyers, so bubbles are seen

as falling prices, not rising. Bubbles are a concern to any trading firm, including banks and insurers, and a particular challenge to ERM.

The key attributes of ERM are that firms should:

- Identify risks in all areas at once,
- Consider how risks can affect more than one area,
- Use consistent measures so that different risks and different operations can be compared and
- Use these measures in decision making.

Bubbles end much faster than they inflate, after a trading break directs the market's attention away from trends and back to fundamental value, which changes much less than prices. ERM innovations did not manage this bubble well. Price and volatility data before and during a bubble do not reflect levels after the "pop," so economic capital models are inaccurate. Mark-to-market rules accelerate bubbles on the way up. The Basel and Solvency II standards rely too much on firms' internal assessments.

But inflated views of values are widely held, so external assessments are no better. Rating agencies and modelers are diligent and objective, but they are also susceptible to bubbles. CDOs were highly rated before their collapse. Ratings and models evolve as their authors learn from events, so they do not mean the same things at different dates.

#### Cycle Management

The insurance market has similar cycles driven by delays in recognizing results. Cycles cause a bias in how individual insurers, their reinsurers and the market measure their costs, exposures and risk.

An economic capital model for insurance risks should include the potential phase of the underwriting cycle (that is, its level). The phase of the cycle can only be known after it turns, so the phase is unknown, just like trends, renewal retentions and catastrophes. The charge for cycle risk will be the derivative of a risk measure with respect to the unknown

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phase variable. (It will be sinusoidal because a function with  $f' = -f$  is in the sine family.) The charge reflects:

- Amplitude of the bias that is expected for a product (bigger bias = more risk),
- Time since the last trough (longer = more risk) and
- Perceived height of the current cycle (the better you think things are, the worse they can really be.).

In a simpler approach, without capital modeling, insurers should use line or position limits to control leverage, grow less than simulated risk models suggest is prudent, expect good results to “slip” back and manage their gross underwriting performance, as well as the net.

#### Regulatory and Accounting Challenges

With commitments now of \$150 billion to AIG, the outgoing administration, many legislators and some trade groups have called for federal regulation of insurance and derivatives. We expect increased regulation and solvency oversight from all aspects of government.

In a time of distress, price information is limited. As a result, when a firm sells an underperforming asset, that single point has an immediate effect on others' statements.

In derivative products, that fall can be magnified many times over, even though a rational buyer might look through to the underlying mortgage and see a higher value. Since financial institutions trade across boundaries, and trades can be multiples of firms' capital, their results are closely linked. The same losses have actually been reported over again, as “spirals” of mortgage insurance claims, CDO write-downs, guarantees of CDOs, falls in the price of bonds, preferred stock and debt, credit default swaps and bankruptcies. A lot of the current problems, perhaps the dominant share, and the speed of the decline, were caused by mark-to-market accounting.

While having collateral from your trading partners is always good, getting extra collateral later adds instability to the entire system. This is required in the EU for banks under Basel and for insurers under Solvency II, and is included in the NAIC reinsurance security proposal. This unintended hazard should be discussed by policymakers.

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## Our Titanic Crisis: An Economic Rescue Plan

by Bertram Horowitz, Inc.

Our current financial crisis has wreaked havoc on the credit markets, the stock market and the entire economy. We must remember that the root cause of this crisis is the collapse of the residential housing market, which has been further exacerbated by the continuing downward housing spiral. Most of the \$700 billion in TARP rescue funds have been deployed as capital infusions into banks and financial institutions in an attempt to address our economic crisis at the institutional and trading level. This alone will not rescue the economy. **A comprehensive solution must directly address the residential housing market catastrophe.**

Establish "Federal Home Mortgage Insurance Company"

A solution to the financial crisis would be the creation of a Federal Home Mortgage Insurance Company (FHMIC). Just as the FDIC was created to encourage and safeguard individual bank deposits, the FHMIC would retain the private banking mechanism for home mortgages and insure bank mortgages to homeowners. **Banks and lending institutions would then have an incentive to refinance and issue mortgages since the FHMIC would insure mortgages against default.** FHMIC would be a nonprofit insurer designed to serve as a catalyst to stimulate and support the residential housing market, which would: help financially distressed homeowners refinance or modify their mortgages and stay in their homes; provide incentive for lending institutions to grant new loans; and facilitate the gradual rise in prices in the housing market. The FHMIC could be structured to be self-supporting and would be essential to the rescue of the economy.

FHMIC Guarantees Against Mortgage Credit Default Risk

The root of the housing crisis is that mortgages were granted without regard to traditional mortgage underwriting standards, and this resulted in the current subprime mortgage crisis. **It is imperative that lenders return to more traditional mortgage underwriting criteria when**

**evaluating a homeowner's eligibility for a refinance, modification or new mortgage.** The FHMIC would provide mortgage insurance to the banks for primary residence mortgage loans that meet modified traditional mortgage underwriting standards. Traditional mortgage underwriting standards include: no more than 80 percent mortgage loan to appraised value; no more than 28 percent of income devoted to housing expenses; full income verification; and good credit history.

FHMIC would require that the distressed homeowner be required to pledge additional assets such that the pledged assets plus the current assessed value of the home is, at least, 5 percent greater than the amount to be refinanced. In return, the homeowner's monthly payment is reduced to as low as the original monthly payment. Upon meeting FHMIC mortgage insurance underwriting criteria, the lending institution would receive FHMIC mortgage insurance, which guarantees against credit default risk. Mortgage insurance premium is passed through to the homeowner and is paid in the future (e.g., when the home is sold). **FHMIC would be the underlying insurance mechanism employed to address the residential housing crisis.**

Dire Case: Home Underwater, Skyrocketed Monthly Payments

Most difficult to address is the case of a homeowner whose house is "underwater" (i.e., worth less than the outstanding mortgage) and where the homeowner's monthly payment has skyrocketed. FHMIC would facilitate efforts for such homeowners to keep their home while largely retaining the general principle of traditional underwriting standards. Consider the following representative cases:

1. 2005—homeowner purchases house in Stockton, Calif., for \$500,000 and receives an interest-only mortgage of \$500,000 at an initial "teaser" ARM interest rate of 4 percent resulting in a monthly mortgage payment of \$1,667.

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2. 2008—interest has adjusted upward to 8 percent, resulting in a monthly mortgage payment of \$3,333 and the current appraised value of house has fallen to \$300,000. The house is now \$200,000 “underwater.”
3. Homeowner faces loss of home with the original lending institution left holding a non-performing mortgage in default. There is great temptation for the homeowner to simply walk away from his house and face foreclosure and/or bankruptcy. As this sort of dire situation has played itself out over millions of homes, it is magnified upward through the banking system, our credit and stock markets, and through the entire economy.
4. Lending institutions and service providers are required to contact homeowner and advise eligibility to refinance or modify his current mortgage with the same or another lending institution. Qualifying criteria and a new application form would be included as well as availability of counseling services from the FHMIC regarding refinance options.
5. Homeowner applies for refinance or modification. In order to meet the loan-to-value requirements, the homeowner must pledge, as collateral, additional assets in non-borrowed funds totaling, at least, \$225,000 (special legislation would be enacted to also permit assets from retirement plans and anticipated inheritance to be held in trust until the value of the home increases) in addition to the \$300,000 in collateral from the current appraised value of the home.
6. Homeowner’s application is reviewed to determine whether it qualifies for refinance or modification of current mortgage using modified traditional underwriting standard criteria as required by FHMIC. Since the \$300,000 appraised value plus the \$225,000 pledged assets equal \$525,000 and this is, at least, 5 percent greater than the \$500,000 outstanding mortgage balance, the modified FHMIC loan-to-value criterion has been met.
7. Assuming the homeowner meets all FHMIC underwriting criteria, the FHMIC grants mortgage insurance to the lending institution, and the homeowner is offered a new \$500,000 mortgage loan under terms the homeowner can now afford.
8. The homeowners accept the new terms and the original \$500,000 loan is satisfied. The homeowners’ monthly payment is returned to \$1,667 computed at the original 4 percent interest rate. Assuming the prevailing interest rate is 5 percent, the imputed difference in the monthly payment of \$417 (and interest on lost interest) is added to the outstanding principal. When the loan is satisfied, the homeowner is required to pay the bank’s mortgage insurance premium for obtaining FHMIC insurance on the mortgage. At any point throughout the loan, the homeowner could pay off a portion of the loan, which would lower their final mortgage insurance premium as well as the outstanding principal. As housing prices rise, pledged collateral may be released back to the homeowner as the loan-to-assessed value ratio decreases.

*FHMIC Facilitates Solution...*

Instead of suffering the burden of home loss (#3), FHMIC provides an insurance mechanism to progress toward a solution:

4. Lending institutions and service providers are required to contact homeowner and advise eligibility to refinance or modify his current mortgage with the same or another lending institution. Qualifying criteria and a new application form would be included as well as availability of counseling services from the FHMIC regarding refinance options.
5. Homeowner applies for refinance or modification. In order to meet the loan-to-value requirements, the homeowner must pledge, as collateral, additional assets in non-borrowed funds totaling, at least, \$225,000 (special legislation would be enacted to also permit assets from retirement plans and anticipated inheritance to be held in trust until the value of the home increases) in addition to the \$300,000 in collateral from the current appraised value of the home.
6. Homeowner’s application is reviewed to determine whether it qualifies for refinance or modification of current mortgage using modified traditional underwriting standard criteria as required by FHMIC. Since

A Comprehensive Plan: Fairness and Benefits to All Parties

This plan is intended to balance equities between all parties. It is worthwhile to consider the benefits to various parties from each of their perspectives:

*Distressed homeowner*—retains ownership of home and stays in community; monthly payments returned to original low monthly payment; retains ownership of pledged assets that may be released back to homeowner at later date; pays for benefits received at time of loan satisfaction.

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*Secure homeowner*—fewer homes dumped onto the market at rock-bottom foreclosure prices—decline in home values reversed because of decreased supply; recognizes that distressed homeowner neighbor is not being bailed out “for free.”

*Prospective homeowner*—the existence of FHMIC mortgage insurance encourages lending institutions to grant low interest mortgages to new home purchasers.

*Lending institution*—incentive to lend because of FHMIC mortgage insurance; investment is largely protected by FHMIC mortgage insurance (a 10 percent deductible is recommended so the lending institution assumes some risk); roughly 5 percent rate of return on largely government-backed mortgage assets.

*Taxpayer*—FHMIC is a sound, non-profit, self-supporting insurer with strict underwriting standards; FHMIC could be initially capitalized with some of the TARP funds designated to address potential foreclosures; perceives FHMIC as housing analog to FDIC for bank deposit insurance; overall economic health of country enhanced.

As with all properly priced insurance policies, the insurance premium is commensurate with the risk: the greater the risk of default, the higher the mortgage insurance premium. In addition to mortgage insurance premium, FHMIC could marshal additional assets from bailout funds as well as other parties who may be responsible for the subprime crisis including appraisers, credit rating agencies, fraudulent applicants, predatory lenders and predatory mortgage brokers.

This plan would not prevent all foreclosures as many homeowners would still be unable to meet even modified underwriting mortgage standards, and FHMIC would deem such homeowners' mortgages to be “uninsurable.” Lending institutions would still be encouraged to directly renegotiate mortgage workout terms with homeowners who not qualify for FHMIC mortgage insurance.

Why This Plan?

Unlike typical insurance, a unique characteristic of FHMIC insurance is that it actually acts to prevent losses. We are only at the beginning of a looming foreclosure crisis. The financial markets have, in effect, responded to a projection of future foreclosures on a massive scale. The proposed FHMIC intervenes and significantly reduces the otherwise anticipated foreclosure catastrophe. Addressing individual residential homeowners' distressed mortgages becomes the engine that propels the rescue solution upward to the banks, the financial institutions and finally through our entire economy here and, potentially, abroad. The continued downward economic spiral would be reversed: more homeowners would remain in their homes with affordable loans; financial markets would recognize that the problem is effectively mitigated; housing values would rise and the market value of mortgage-backed securities would increase; lending institutions would unlock credit; balance sheets would be cleaned up; and employment would rise. The contagion spread by the subprime crisis would be reversed as the solution spread through the economy.

FHMIC would provide a catalyst for banks and lending institutions to rescue sinking homeowners and avert catastrophic consequences. We have a choice. We can settle for watching our economic Titanic sink and a large segment of its homeowner passengers perish while we concentrate on saving financial institutions...OR... **we can intervene in a meaningful way and provide incentive to the lending institutions to throw the sinking homeowners a lifeline and save both the financial institutions and the individual residential homeowners. In the process, we will have stabilized and improved the entire economy through “trickle-up economics.”**

*This essay offers an opinion regarding a proposed solution to our current financial crisis and is intended only as a general discussion. Bertram Horowitz, Inc. Actuarial and Risk Consultants, would be pleased to provide additional details.*

**Our Titanic Crisis: An Economic Rescue Plan** by Bertram Horowitz, Inc.

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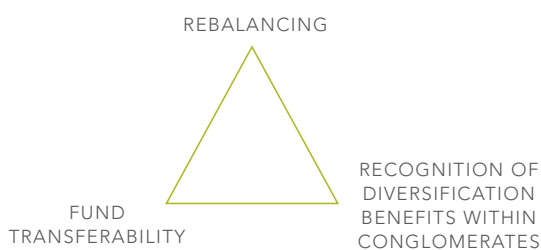
## It is Time to Decide What Kind of Crises We Want to Have in the Future

by Ioannis Chatzivasiloglou and Charalampos Fytros

Crises are devastating. They leave behind a high amount of entropy (unemployment, poverty, lack of safety). But this is half the truth. The other half says that crises are to some extent good, because they provide a natural crash test to discover current practices' risks and limitations, and in response give rise to more efficient regulation, to financial innovations and to the wakening of the vitalizing powers of society, as the old and corrupted die and new ideas emerge and give us the opportunity to reflect upon the future we want to have.

Now that the basic structures of the financial system have collapsed, it is time to reflect and decide what kind of crises we really want to have in the future (the option of not having crises in the future, unfortunately, is unavailable). In order for our decision to be effective, it should be informative. This is why we should elaborate more on the basic structure of the current crisis.

The three factors that this paper distinguishes to support the genesis and the proliferation of crises can be depicted as the three angles of a pyramid:



Let's make some definitions:

Let a micro-crisis be a crisis that is faced by a certain company, or a group of companies (either banking group, insurance group or a conglomerate). A micro-crisis is restricted to the group and is local in nature.

And let a macro-crisis be a crisis that affects macroeconomic factors and consequently real economy.

Fund transferability (at the one bottom of the pyramid) is defined as the ability of funds to be transferred from one specific subsidiary of a group to another subsidiary of the same group which is in financial difficulty. The higher the ability to transfer funds, the higher the probability a potential crisis inside a group never emerges. Therefore, the level of fund transferability implicitly defines the frequency for a micro-crisis to emerge.

On the other bottom of the pyramid, if diversification benefits at the level of a group are recognized, the overall (i.e., at the group level) capital available to fund potential micro-crises is lower than the sum of the capital of the subsidiaries of the group. The lower the perceived correlation between the subsidiaries, the higher the diversification benefits recognized by the regulator and the lower the total capital of the group—which essentially means lower risk capital to absorb potential losses. Therefore, the level of diversification benefits implicitly defines the severity of micro-crises.

Both fund transferability (frequency) and recognition of within-group diversification benefits (severity) make up the bottom line of the pyramid, i.e., the micro-level.

Rebalancing is the term used to denote the macro-level, on top of the pyramid. Why is such a term used? Consider an institutional or even an individual investor: consistent with his/her investment policy statement, s/he follows a method of rebalancing so that the portfolio's long-term strategic allocation is not heavily distorted by the drifting values of the underlying assets. Now consider the largest possible investor—the government. Does this exceptional investor differ so radically? Governments spend, leverage, sell and lately invest in distressed securities. Their portfolio is society, and this portfolio should at minimum be balanced. So, rebalancing seems quite essential not only for the average institutional or individual investor but in this case too. Letting big-company financial establishments become bigger is like letting your originally strategic alloca-

**It is Time to Decide What Kind of Crises We Want to Have in the Future** by Ioannis Chatzivasiloglou and Charalampos Fytros

tion drift away while undertaking a series of concentrated exposures that might affect the value of your whole portfolio—in this case, society itself. Financial institutions have the potential to leverage profits or losses by using a void but powerful substance: it is called credit. Proper rebalancing, i.e., imposing a ceiling on the amount of credit a financial institution might use or invest upon, contributes to a long-term financially balanced society (given that governments opt for such a long-term balanced strategy).

We talked about a pyramid. This pyramid is not static: it constantly moves like a pendulum. The nail is at the point of “Rebalancing”; at the bottom of the pyramid, you may

find two antidiagonally placed massive bobs: “Fund transferability” and “Recognition of diversification benefits within conglomerates.” The higher their masses (when, for example, lower fund transferability and higher diversification group benefits coexist), the higher inertia contributes to a highly uncontrolled swinging back and forth, i.e., the more intense the crisis. “Rebalancing” determines friction in the pendulum movement: the lower the ratio of credit to real output (imposed by a consistent rebalancing strategy), the lower the size of financial risk: swinging finds a natural resistance.

We may have a choice upon future crises:

Macro Level	Micro Level		
Financial Risk	Fund Transferability	Regulator’s Recognition of Real Diversification Benefits within Conglomerates	Crisis
No Rebalancing	Low	High	Macro-level: Uncontrolled Micro-level: Low/High frequency, high/low severity Overall: Varying effects that do not exclude extremities
No Rebalancing	High/Low	High/Low	Macro-level: Uncontrolled Micro-level: Low/High frequency, high/low severity Overall: Varying effects that do not exclude extremities
No Rebalancing	High	Low	Macro-level: Uncontrolled Micro-level: Low frequency, low severity Overall: Varying effects that do not exclude extremities. Managed
Rebalancing	High/Low	High/Low	Macro-level: Controlled Micro-level: Low/High frequency, high/low severity Overall: Managed
Rebalancing	High	Low	Macro-level: Controlled Micro-level: Low frequency, low severity Overall: Preferred

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## The Financial Crises: A Ripple Effect of Incentivised Disorder

by Paul Conlin

The current financial crisis is the result of the interplay of changing circumstances, since the 1970s, on Main Street, Wall Street and internationally.

On Main Street, savings and lending used to occur locally. There's the classic scene from "It's a Wonderful Life" where the depositors of a local S&L demand their savings back from the bank manager, played by Jimmy Stewart. He says, correctly, that he can't give them their money back because he doesn't have it—it's invested in the homes of their neighbors. In the world portrayed by the movie, lending standards were monitored by local lending officers in the communities—lending never got too loose, since the S&Ls would have to eat the losses; or too tight, since no loans would happen. And when blow-ups did occur, as in Texas in the 1980s oil glut, they tended to be contained locally. But the S&L crisis of the 1980s destroyed the local savings institutions and ushered in the era of interstate financial conglomerates that borrow funds, short term, from the worldwide credit markets.

On Wall Street, the investment banks were partnerships. When the Wall Street firms underwrote a deal or traded securities, it was the personal wealth of the partners on the line, so solvency was highly incented. During the 1970s, the partnership ownership structure constrained growth of the Wall Street firms and caused capital shortages. Donaldson Lufkin Jenrette filed for public ownership in 1969, and the stock market boom of 1982–2000 caused most of the others to follow. With shareholders putting a premium on earnings growth and return on equity, the Wall Street firms increased leverage and risk. They had no margin of error for the wave of credit defaults, which were to begin in 2007.

Finally, internationally, the lapse of the Bretton Woods monetary system in 1973 and free float of currencies allowed the United States, the highest currency on the food chain, to sustain massive budget and trade deficits. Devel-

oping economies (first Japan, then Korea/Singapore/Hong Kong and finally China/India) adopted protectionist/capitalist strategies similar to what the United States adopted in the 1800s. But unlike the American consumer, the consumer of these export-led economies never switched from a savings- to a consumption-based lifestyle. Even in now-developed Japan, consumers save a substantial portion of their income. So the large surpluses in the world continue to recycle back into the United States, including disproportionately (thanks to the implied, and after Sept. 8, 2008, the official, government backing of Fannie Mae and Freddie Mac) into American housing.

The world of the local S&Ls, the partner-owned investment bank and Bretton Woods isn't coming back. So what does that leave us to do next? Part of me is persuaded by the second law of thermodynamics, which says that existence gets progressively more and more disordered with the passage of time, since any work done to address the current crisis expends more energy and causes more disorder than it fixes.

On the other hand, we need to at least try something. The lending of money by \$500-per-year Chinese factory workers to Americans to buy \$250,000 houses strikes me as the best place to start. A home mortgage should not be able to be securitized. If this makes it more difficult for Americans to borrow for homes, so be it—the true economic costs (and risks) of such loans must be reflected in mortgage rates, and the ripple effect must be felt in home prices. There is an insurance precedent for this—a primary insurer can transfer risk to a reinsurer, but always remains on the hook if the reinsurer defaults. A mortgage loan must be a permanent arrangement between the lender and borrower—if this is not acceptable to either, no problem: no deal. Legislation and regulation codifying such a (seemingly, by comparison to current rules) draconian regime must be enacted while the consequences of the alternative are fresh.

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## Prudent Enterprise Risk Management Strategy: Culture

Your Mother Should Know

BY DAVID INGRAM

Mixed Risk Management Strategies – Diversification That You Can Count On

BY WENDY YU

Derivatives, AIG and the Future of Enterprise Risk Management

BY MICHAEL G. WACEK

The Democratization of Risk Management

BY MICHAEL C. SCHMITZ AND SUSAN J. FORRAY

Should You Have a Chief Skeptical Officer?

BY MAX RUDOLPH

Lessons from the Financial Crisis for Directors and CEOs of Insurance Companies®

BY JEAN-PIERRE BERLIET

Against the Grain: The Wisdom of Countercyclical Capital

BY ANSON J. GLACY, JR.

## Your Mother Should Know

by David Ingram

Something as massive as the current financial crisis is much too large to have one or two or even three simple drivers. Below is a discussion of three drivers that are often not at the top of lists about the origins of the crisis. And in all three cases, my mother would have cautioned against those mistakes.

When I was 16, I had some fine arguments with my mother about the girls that I was dating. My mother did not want me dating any girls that she did not want me to marry. That was absolutely silly, I argued. I was years and years away from getting married. That was a concern for another time. My mother knew that in those days, “shotgun marriages” were common, a sudden unexpected change that triggered a long-term commitment. Even without getting a shotgun involved, five years later I got married to a girl that I started dating when I was 16.

Well, there are two different approaches to risk that firms in the risk-taking business use. One approach is to assume that they can and will always be able to trade away risks at will. The other approach is to assume that any risks will be held by the firm to maturity. If the risk managers of the firms with the risk-trading approach would have listened to their mothers, they would have treated those traded risks as if they might one day hold those risks until maturity. In most cases, the risk traders can easily offload their risks at will. Using that approach, they can exploit little bits of risk insight to trade ahead of market drops. But when the news reveals a sudden unexpected adverse turn, the trading away option often disappears. In fact, using the trading option will often result in locking in more severe losses than what might eventually occur. And in the most extreme situations, trading just freezes up and there is not even the option to get out with an excessive loss.

So the conclusion here is that, at some level, every entity that handles risks should be assessing what would happen if they ended up owning the risk that they thought they would only have temporarily. This would have a

number of consequences. First of all, it could well stop the idea of high speed trading of very, very complex risks. If these risks are too complex to evaluate fully during the intended holding period, then perhaps it would be better for all if the trading just did not happen so very quickly. In the case of the recent subprime-related issues, banks often had very different risk analysis requirements for trading books of risks vs. their banking book of risks. The banking (credit mostly) risks required intense due diligence or underwriting. The trading book only had to be run through models, where the assignment of assumptions was not required to be based upon internal analysis.

My mother would often caution me against some activity by saying, “What if everyone did that?” She did not allow any actions that were not sustainable as a general course for everyone.

Well, an implicit assumption in the way that many practitioners use financial models is that their planned activity is marginal to the market. If you ask the manager of a large mutual fund about that assumption, they will generally laugh out loud. They are well aware that their trades must be made carefully to avoid moving the market price. Often they will build up a position over a period of time based upon the normal flow of trading in a security. That is a very micro-example of non-marginality. What happened with the subprime mortgage market was a drastic shift in activity that was clearly not marginal. When the volume of subprime mortgages rose tenfold, there were two major changes that occurred. First, the subprime mortgages were no longer going to a marginally more creditworthy subset of the folks who would technically fit into the subprime class; they were going to anyone in that class. Any prior experience factors that were observed of the highly select subprime folks would not apply to the average subprime folks. So what was true on the margin is not true in general.

The second marginal issue is the change in the real estate market that was driven by the non-marginal amount

Your Mother Should Know *by David Ingram*

of new subprime buyers who came into the market. On the way up, this expansion in the number of folks who could buy houses helped to drive the late stages of the price run-up because of that increased demand. That increase in price fed into the confidence of the market participants who were feeding money into the market.

Risk managers should always be aware that marginal analysis can produce incorrect results. They should follow my mother's caution "What if everybody did that?" and look into their statistics more carefully.

When my friends and I gathered in my backyard to play various games, my mother always kept her ears open. She was always pointing out that I was often trying to impose rules or rulings that would in current business terms be called self-dealing.

There were signs that something was dangerously wrong in the U.S. housing market at least six months prior to the August 2007 market freeze. Back in February 2007, HSBC reported large additions to mortgage loan loss reserves for its U.S. business. The first public reports of a stoppage in the run-up of real estate prices came out in the spring of 2007. But several of the firms that experienced the largest losses did not stop their activity until the day that the market froze. How could they be so blind?

Some of this was driven by the folks who themselves were employed full-time doing that business. To them, this activity was the sole source of their income. They had to keep dancing. They had to hold the opinion that the bad news was a temporary blip and that things would soon turn around. In fact they had very strong incentives to portray the situation that way and to cast doubt on anyone who claimed otherwise. That would make the decision to pull

back on the subprime-related activity a battle between the financial/risk area and a major revenue source. The extreme version of this issue is what is being reported in the press about the accounting for the financial products unit at AIG, where the business unit head excluded a key audit person from their discussions of how they would account for their CDS business—where decisions were made that ultimately led to a finding of material weakness by the independent auditor.

Risk takers need to have a reliable source of independent information about the risks of their businesses that is outside of a political fray. It happens again and again that business managers portray the risk assessment as a political decision. But a simple look at incentives would reveal that only one player—the business managers themselves—has the incentive to push a particular point of view. A simple grid can be established that looks at four possibilities: 1) that the negative risk assessment is true and the firm acts to reduce potential losses; 2) that the risk assessment is false and the firm reduces activity to reduce losses; 3) that the assessment is false and the firm acts; or 4) that the assessment is false and the firm does not act. Under most compensation programs, the business manager will be incented to continue business regardless of the risk. They are incented AGAINST risk management. Usually, the risk manager incentives do not change materially under any of the four scenarios. Top management needs to be aware of this incentive mismatch when listening to the arguments.

Often you hear the phrase "it's not the money it's the principle," which almost always indicates that it is the money. My mother would have known.

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## Mixed Risk Management Strategies – Diversification That You Can Count On

by Wendy Yu

After all this time, I am still shocked that certain investment banks (that are experts at distributing credit risk) held so much credit risk at the worst possible time. For insurers to avoid similar situations, the obvious solution is to clearly identify their roles as risk distributors or risk insurers. However, this is not always a realistic option in a world with sticky prices and volatile market shares. A more realistic solution is to develop a diverse portfolio of products backed by a diverse set of risk management strategies.

I recently witnessed a number of heated discussions between actuaries on whether market-implied volatility (the price of risk according to the options market) should be used in pricing long-term products. More generally, in our increasingly mark-to-market world, what does it mean to use the market price of risk in pricing long-term products?

For a distributor of long-term market risk, it makes sense to use market-implied volatility, because the distributor generally pays the market price of risk when it transfers the risk to the capital markets or reinsurers. The problem facing risk distributors is that product pricing is sticky, whereas the market price of risk can be quite volatile. This disconnection can become particularly severe during market downturns.

An insurer of long-term market risk, on the other hand, needs to take a long-term perspective. At the peak of an economic cycle, the risk appetites of market participants are high, driving down the market price of risk. Does it make sense to charge a low price for long-term risk at the peak of an economic cycle, when downward shocks to the financial markets are more likely? Conversely, does it make sense to charge a high price for long-term risk at the bottom of an economic cycle, when upward market movements are more likely? For a risk insurer, an approach based on long-term historical data and actuarial prudence is likely to do better. The problem facing risk insurers is maintaining market share in benign market conditions when the market price of risk is low.

Strategies that are dynamic with respect to time can potentially eliminate the latter problem. Consider the following as an example.

### Stable markets

- Transfer long-term risks
- Use market price of risk in pricing
- Lower capital requirement

### Volatile markets

- Hold long-term risks
- Use long-term historical data and actuarial prudence in pricing
- Higher capital requirement

However, strategies that are dynamic with respect to time are difficult in practice, since they require more capital in volatile markets. Again, the fact that product pricing is sticky poses a significant challenge.

Strategies that are diversified with respect to product are less demanding in terms of capital management and product pricing. Consider the following as an example.

### Accumulation product

- Transfer long-term risks
- Use market price of risk in pricing
- Lower capital requirement

### Income product

- Hold long-term risks
- Use long-term historical data and actuarial prudence
- Higher capital requirement

The key is to maintain a diverse portfolio of products so that the capital requirement is relatively stable across time. For each product, the pricing methodology is consistent across time. In benign market conditions, the price of the accumulation product is likely to be competitive. In volatile market conditions, the price of the income product is likely to be competitive.

**Mixed Risk Management Strategies – Diversification That You Can Count On by Wendy Yu**

Another important benefit of a mixed risk management strategy is that the additional knowledge acquired in implementing multiple strategies would help insurers refine each strategy. This benefit should not be underestimated. Just as the best asset class ceases to be the best when everyone invests in it, best practice risk management ceases to be best practice when everyone practices it.

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## Derivatives, AIG and the Future of Enterprise Risk Management

by Michael G. Wacek

As one highly rated financial firm after another blows up, what is the right conclusion to draw about enterprise risk management (ERM)? Does the financial crisis of 2008-09 demonstrate its criticality, or does it bring the whole concept into disrepute?

Alan Greenspan has been criticized for his admission in Congressional testimony that he had “looked to the self-interest of lending institutions to protect shareholders’ equity” and was “shocked” that such self-interest had not motivated better risk management. His critics claim that such a view was naïve and that more regulation was (and remains) necessary.

Greenspan believed that well-managed companies know how to optimize their own enterprise risk and will *voluntarily* seek to do so. Would more prescriptive regulation really improve ERM effectiveness, or would it merely further encourage companies to manage the measures outsiders have decided are important? The real imperative of ERM is to optimize a company’s upside aims and downside risks within a set of constraints defining its own risk appetite. If Greenspan’s critics are right, and we must look to rating agencies and regulators to define the risks and how to measure them, then ERM will likely never amount to more than a game of minimizing the reportable magnitude of externally specified risk measures. Unfortunately, that seems to be how it has been practiced until now by many companies, including some highly touted for their superior risk management prowess.

The surge in recent years in the use of derivatives to obscure balance sheet risks is a manifestation of that approach. Investors and other users of financial statements, including regulators, have developed an intuition about the likely volatility of balance sheet assets and liabilities. They know that, everything else being equal, companies with highly leveraged balance sheets (i.e., high ratios of assets and liabilities to equity) are riskier than those with less leverage. Knowing that the market frowns on excessive

balance sheet leverage, many companies have looked for ways to minimize the size of the assets and liabilities they reported on the balance sheet. Derivatives are attractive because they can often be structured to replicate traditional asset transactions but with a much lighter balance sheet impact. Clearly, not all derivative transactions are bad, but in some cases, they can facilitate a business strategy that would not be executed using traditional assets.

AIG’s short portfolio of credit default swaps (CDS), reportedly totaling \$450 billion of “notional” limits at the time of the government rescue, is a case in point. Writing a CDS on a corporate or asset-backed bond is effectively the same as buying the bond and shorting a risk-free government bond to harvest the risky bond’s credit spread. However, the two approaches result in radically different entries on the balance sheet. The short CDS position is booked at market value as an “other liability.” The market value for a CDS is roughly the present value of the market credit spread on the reference bond in dollar terms over the remaining life of the swap. For example, the market value of a seven-year \$10 million notional amount CDS on Fannie Mae subordinated debt in late February 2007 was about \$110,000, reflecting a credit spread of 19 basis points (0.19 percent) per annum. A writer of that CDS on that date would have booked an asset of \$110,000 and a matching \$110,000 “other liability.” In contrast, assuming the Fannie Mae bond was trading at par value, an institution executing the other equivalent credit-spread-harvesting strategy would have booked a “fixed income” asset of \$10 million and a matching \$10 million “obligation to return borrowed securities” liability. In February 2007, the balance sheet impact of the CDS-based strategy was only about 1 percent of the equivalent strategy that used Fannie Mae and risk-free government bonds!

As of Dec. 31, 2006, AIG’s assets totaled about \$1 trillion, and its GAAP shareholders’ equity was about \$100 billion. Would its management have been willing to execute the bond equivalent of its CDS business plan, i.e.,

Derivatives, AIG and the Future of Enterprise Risk Management by Michael G. Wacek

borrow \$450 billion to purchase a portfolio of corporate, asset-backed and foreign government bonds? I doubt it. Even if management had been willing, it is unlikely that AIG's investors and creditors would have allowed it. However, the favorable balance sheet optics provided by CDS enabled AIG management to pursue an *extremely* leveraged business strategy without attracting much attention and perhaps without itself fully understanding it.

The danger posed by short CDS arises from their enormous leverage. As a result of a widening of credit spreads on relatively safe Fannie Mae debt, the market value of the Fannie Mae CDS cited earlier skyrocketed nearly *eightfold* from \$110,000 in February 2007 to about \$800,000 by June 30, 2008, obliterating the initial \$110,000 asset and producing a loss of 627 percent! CDS on riskier bonds fared even worse.

As risky as they are, the issue is not the CDS themselves, but rather how they are modeled and how well modeling results are understood and used by management. A self-disciplined company with an effective ERM program does not merely take its risk management cues from how its risks look from the outside. It seeks to model and limit the actual risks inherent in its business plan and balance sheet.

AIG reported a very low "capital markets trading" value-at-risk (VaR) as of December 2007 for the financial products unit, which wrote the CDS portfolio. While that VaR calculation reflected interest rate, equity, commodity and foreign exchange risks, the company admitted that, "Credit-related factors, such as credit spreads or credit

default, are not included in AIGFP's VaR calculation." (AIG 2007 Form 10-K, p. 124.) That is like a property insurer monitoring the potential cost of claims from all perils affecting policies exposed in Florida...except for hurricanes! It suggests that AIG management did not understand its business well enough to properly supervise the risk modeling of the CDS portfolio.

This episode and others like it potentially create credibility problems for ERM. Because risk modeling is a centerpiece of ERM, when poorly supervised, but apparently sophisticated modeling *exacerbates* a business disaster rather than helps to avoid it, it is viewed by some as a general failure of both risk modeling and ERM. To prevent the baby from being thrown out with the bathwater, it is essential that the current financial crisis be studied closely to identify the real ERM successes and failures, and to distinguish between those companies who truly managed their enterprise risks and those who merely pretended. The results should be widely promulgated.

Ultimately, the market will decide on the importance of ERM. Over time, the market will punish companies practicing the window-dressing version of risk management and reward those whose ERM proves effective. In the current crisis, while critics complain about government "bailouts" of failing companies, the fact is that investors in those companies have suffered enormous losses. In the future, once burned, twice shy, investors will undoubtedly seek to learn much more about the quality of ERM within the companies in which they invest.

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## The Democratization of Risk Management

By Michael C. Schmitz and Susan J. Forray

This year's financial crisis was described by Alan Greenspan as a once-in-a-century event. Similarly, the floods in the Midwest of this past summer were described as 500-year floods. Both characterizations, and both events, serve to remind us of the difficulty in predicting such calamities and in gauging their ultimate scope and effects. Just think: How many once-in-a-century events have occurred this decade?

For the most part, actuaries accept as necessary a key assumption underlying the majority of their work—that historical patterns have predictive value for the future. Yet, paradoxically, it's also understood that assumptions are not precise, that models sometimes fail, and that the only certainty attached to any point estimate is that, once experience is factored in, the actual number is sure to be different.

The current financial crisis reminds us of risk's supremacy, while leaving us with several key lessons that can help all of us better manage risk in the future.

### 1. Models Are Not Perfect

Most of us know it already: Models are imperfect approximations of reality. They are valuable, *but incomplete*, abstractions and only as good as their underlying assumptions. Actuaries are well-positioned to build more robust models and to assist in understanding the assumptions and limitations of those models.

In some cases, models may be incomplete partly because they rely on a relatively shallow pool of data. Mortgage credit risk models based on limited data from years with consistently rising home prices might have suggested only limited risk. However, with more robust data over a broader range of economic conditions, a good deal more risk would be evident. There are strategies to build more uncertainty into models, but they are based at least partly on judgment calls.

Risk management efforts can be jeopardized when managers blindly rely on models without regard to the amount of data underlying them and the reasonableness of the assumptions. One cannot forget that the risk illustrated by the model will only be the risk that has been present historically, or judgmentally added into the model by its developer.

Models are often subject to their greatest limitations just when they are needed the most. For example, one might be more inclined to build a model to assist in pricing an excess layer than to price a primary layer—where historical data by itself may be considered sufficient. However, the volatility inherent in any excess layer may not lend itself easily to modeling, and could easily be over- or underestimated. Similarly, mortgage credit risk models that have too little tail risk built into them would result in a leveraged understatement of risk in the mezzanine and higher layers of mortgage-backed securities.

As actuaries, our role is to assess the reasonableness of the projections in any model we build, as well as to communicate the uncertainty inherent in the model to others. The use of models should be accompanied by specialized professional judgment concerning those models and the risks they are intended to capture.

### 2. Troubles With Bubbles

The housing bubble, at its root, was not difficult to observe. By comparing house prices relative to income and other measures of affordability<sup>1</sup>, even over 75 years or more,<sup>2</sup> it became clear that these prices were surging. Something unprecedented was occurring. Risky mortgage products never boded well in this context and indeed these same products pushed the bubble further.

But even when it's possible to identify economic bubbles, it's very hard, almost impossible, to predict when they

<sup>1</sup> "What Happens When Credit Risks Come Home to Roost?" Michael C. Schmitz and Kyle S. Mrotek, *Insight Magazine*, Autumn 2006.

<sup>2</sup> *Irrational Exuberance*, Robert J. Shiller, Princeton University Press, 2005 (p. 13).

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will deflate, and how that deflation will manifest itself. The further economic fundamentals get out of balance—that is, the bigger the bubbles get—the more unpredictable, severe and widespread the ultimate fallout becomes.

That makes this lesson one that's simple to understand, yet extremely difficult to implement. Once a bubble has been recognized, that's the time for mechanisms of caution and prudence to kick in, even in the face of exuberance—especially in the face of exuberance.

### 3. The Importance of Staying Hydrated

Global liquidity flowing into mortgage assets to chase yield during a low-interest-rate environment was instrumental in fueling the bubble. This cheap funding to mortgage distributors facilitated the expansion into risky mortgage products.

Once lost, liquidity can be difficult to regain. The liquidity of mortgage assets went out the window when many decided that borrowers could not be counted on to pay their mortgages and when house prices began to decline. More broadly, the capacity of some entities backstopping them was called into question as well. As a result, a downward spiral ensued as these entities were first required to post more collateral, then subsequently downgraded, and in turn required to post more collateral again in response to the downgrades.

At the same time, the market for mortgage assets was drying up, causing difficulties in converting these assets to cash, and making it increasingly difficult to raise that collateral. As the stressed entities were forced to raise cash to cover their shortfalls in capital and liquidity, some requisitely sold into a declining market, exacerbating the spiral.

Liquidity (and trust) is plentiful until it's not—it can evaporate with blazing speed and only returns slowly.

### 4. Saving For a Rainy Day

Maintaining cash reserves to address unexpected emergencies is, of course, a basic tenet of commercial or personal finance and this lesson also applies to capital management. In the same way that an individual might build a cash cushion, they should also plan for the instability of our cyclical economy. But instead, there is a tendency for the good times to get very good, as people and companies leverage their balance sheets and take on more debt in order to maximize the advantage of participating in the market rise.

Then, as markets fall again, the bad times get very bad; de-leveraging can cause a downward turn in the market to accelerate as market participants rapidly sell off declining assets to avoid being caught short by their debt. For example, many companies participated in stock repurchase plans during the boom years when their stocks were at their heights only to find themselves trying to raise money in the teeth of the crisis with their stock prices significantly down from their highs.

Also caught up in the financial downturn is the federal government. If the federal government is the risk manager of last resort, it might be expected to manage symmetrically so as to strive for price stability. It might be expected to lean into booms by raising interest rates and reducing the federal debt. However, fiscal deficits grew leading up to the crisis and some say central bankers have opted for a preemptive asymmetric monetary policy<sup>3</sup>, in which rates were quickly lowered during downswings in the economy, but only slowly increased during upswings.

All of these factors created a more challenging position, because what's generally needed in a financial calamity is loose monetary policy and fiscal stimulus. Indeed, we've seen radical intervention of late, and the scale of the crisis has thus far assisted with a relatively cheap governmental

<sup>3</sup> *The Origin of Financial Crises: Central Banks, Credit Bubbles, and the Efficient Market Fallacy*, George Cooper, Vintage Books, 2008.

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borrowing cost through the flight of investors to treasury securities. However, one hopes that the seeds for the next crisis are not being sown by debt-financing the country's stimulus and bailout packages. Much attention is being paid to counter-cyclical capital regimes in light of the current crisis.

5. Risky Business Is Everyone's Business

Finally, it's important to recognize that unsafe or excessively risky practices can become everyone's problem. In this case, it's not just the buyers and sellers who are affected:

- The neighbors of homeowners and real estate speculators who borrowed beyond their means now see their own property value falling as these homeowners are foreclosed upon, their homes possibly vacant and boarded up
- Subsidiaries and affiliates, whose product units, while entirely solvent in their own right, were brought down by the financial obligations of parent companies who had taken excessively risky mortgage positions

- Competitors, who now experience difficulty raising money because of the endemic problems in capital markets, including liquidity drying up, and waning confidence in the financial markets
- The public, forced to bail out troubled entities perceived as too big to fail, and facing large reductions in the value of their own investments

Risk is contagious, which means every single employee and citizen has a vested interest in taking on the role of chief risk officer. The cost of bailouts falls on all of us. Thus these bailouts come to the financial industry with the quid pro quo of greater regulation and supervision. However, it is critical that such regulatory initiatives are carefully crafted to improve safeguards to systemic risks and transparency without stifling innovation. Indeed, the insurance industry can take a leadership role in designing and distributing new products that allow individuals and companies alike to manage risk in a more effective way.<sup>4</sup> Actuaries have much to offer in this endeavor.

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<sup>4</sup> For example, see Robert J. Shiller's suggestions of home equity and livelihood insurance and continuous workout mortgages as part of his prescription for the democratization of finance in *The Subprime Solution*, Princeton University Press, 2008.

## Should You Have a Chief Skeptical Officer?

by Max J. Rudolph

What a roller coaster ride the past year has been! Occasionally we had respites as the financial markets gained altitude. This made the next day's drop even deeper and scarier. Volatility in the system has increased, not only between months and days but from morning to afternoon. Are we at the bottom now? Who knows? But unless we think the world economy is completely falling apart and we are switching back to a barter system, we should look for learnings that could help prevent future problems. This will also provide a competitive advantage during an inevitable rebound.

The current financial cycle has been particularly harsh. Risk managers at financial firms have not proven effective. They have either not had the authority to address their concerns or have gotten caught up in the excitement of the "new paradigm." Common sense has sometimes seemed in short supply, but this is not entirely fair. As with any crisis, hindsight will be 20/20. The economy has many moving parts. Actions by government and management often lead to unintended consequences.

Many of the reasons for the current crisis are not new. History truly does repeat itself. "It's different this time!" and "You don't understand the new economics" are mantras that have been repeatedly proven false. Some people truly recognize when they create a scheme to rip people off, while others buy into the excitement and sustain the momentum. No one wants to slow down the bus as it rolls downhill.

Many call this the sub-prime crisis, but risky mortgages were simply symptomatic of the underlying excesses building throughout the financial system. Some Wall Street firms used low interest rates driven by government policies to take on high amounts of leverage. Many firms borrowed more than \$30 for each \$1 of their own capital, with neither investors nor bankers knowing the total extent. Private equity firms, investment banks and hedge funds were ring-leaders, but were joined by many other willing participants. Sometimes investments were entered into based entirely on

a rating agency opinion of an asset, with no due diligence performed despite the obvious conflict where the issuer paid for the opinion.

Where was the due diligence? Where was the discipline? Analysts were considered lacking if an investment opportunity made no sense to them. Putting some PowerPoint slides together and giving a presentation created a supposed expert. Large egos ruled.

Investors, government, lenders and borrowers were all at fault. Where did the skeptics go? Where was someone asking the pointed questions? Why didn't chief risk officers identify and mitigate this situation? Why have they been so quiet? Some did identify the growing problem. Those who tried to slow down the "good times" were neutered or ignored. Options included quitting, being fired or being the fall guy.

Risk and return are key components to creating an optimal position, and there needs to be a healthy balance while managing against goals and constraints. Building models is useful as much for what is discovered from extreme scenarios as from the average results.

When a modeler communicates complex results to a lay audience, this helps everyone to better understand the risk/return relationship. Risk management, especially when applied holistically to the enterprise, combines the best of quantitative and qualitative methods. Quantitative models provide an immense amount of information, but can mislead without proper context. Scenario planning, where specific concerns and assumptions are investigated, can provide knowledge to the strategic planning process and a story to accompany the recommendations. Qualitative methods, built from common sense and an effective risk culture, lead to superior results. But these can't work unless the culture encourages challenges to assumptions, models and strategic thinking. Better decisions can be made. There is no free lunch.

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When a firm's culture is driven by growth and manager incentives ignore risks taken, it is only a matter of time until the process implodes. People will naturally gravitate to practices that enhance their pay. That's why it is called incentive pay. A company with a review team available and encouraged to challenge assumptions for both new and old products provides a competitive advantage for that firm. Alternative perspectives are healthy. Their task is to ask tough questions and maintain a consistent company-wide framework. The review team could consist of a combination of internal staff with broad exposure to a company's products and existing balance sheet, external consultants with knowledge of best practices and academics. Broad financial skills developed through the credentialing process make actuaries natural members of such a team. This team should not be viewed as a cost, but rather as an enabler. Better decisions are made by those who think about how a product impacts the firm's existing balance sheet on a marginal basis, not just its standalone effect.

The leader of such a team should have the CEO's ear and be aware of all corporate initiatives. This devil's advocate should be part of the C-suite, and have ownership of the strategic planning process. While internal audit has a role to play, the need here is for a broader role that challenges the risk culture and develops best practices in addition to checking processes. This leader should be prepared to state strong opinions so that improved decisions can be made. It is important for the board to have full access to this person, but the primary focus should be on educating and advising the CEO. This person acts as the firm's "chief skeptical officer." When a business line brings a new idea to the CEO, he should be able to ask, "Have you run this past the chief skeptical officer and does she concur with this proposal?" The CSO (could also be referred to as the common sense officer) might not always be popular, but the improved decisions made will allow the CEO to more confidently execute the company's strategic plans.

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## Lessons from the Financial Crisis for Directors and CEOs of Insurance Companies<sup>®</sup>

by Jean-Pierre Berliet

The present crisis in global financial markets has created an impression that enterprise risk management (ERM) has failed broadly to protect the safety and soundness of the financial system as well as that of many institutions, including insurance companies.

It is ironic, however, that the crisis is often attributed to failures of risk management in leading commercial banks, investment banks and credit guarantors that were once viewed as pace setters in the use of “best practices” in risk governance and risk management.

Results speak for themselves: Bear Stearns and Lehman Brothers have disappeared; Fannie Mae and Freddie Mac have been nationalized; in the insurance industry, XL and The Hartford have had to raise significant amounts of equity to restore their capital strength; AIG has been partially nationalized while other leading companies such as MetLife and Prudential are rumored to have approached the U.S. Department of the Treasury about the possibility of receiving aid under the financial rescue plan that is being implemented. Meanwhile Wells Fargo, Bank of America and Berkshire Hathaway have been able to complete strategic acquisitions or investments that will serve them well in the future. Looking at outcomes, it is clear that some companies were stronger and better prepared. They have done comparatively well.

So what went wrong? What lessons can directors and CEOs of insurance companies learn from the crisis? What can they do to help their companies become more resilient?

Companies that appear to have withstood turmoil best have been disciplined about:

- Managing strategic risks,
- Holding sufficient capital and
- Aligning interests of shareholders and managers.

Their discipline demonstrates that they have been taking risk governance and risk management seriously.

### Managing Strategic Risks

It is not enough for insurance companies to understand and manage the financial risks of their business that can cause insolvency. They need also to manage external “strategic” risks to their business. Strategic risks result from events that can undermine the viability of their business models and strategies or reduce their growth prospects and damage their market value. Strategic risks include changes in competitive dynamics, regulations, taxation, technology and other innovations that disrupt market equilibrium. They also include events and changes in other industries that can impact adversely the going concern viability and financial performance of insurance companies.

Until the present crisis, many insurers did not think much about their dependence on the efficient functioning of credit and other financial markets or the overall safety and soundness of the banking system. Now they do. Although the sub-prime mortgage crisis and resulting credit market meltdown can be viewed simply as market risk events, they should be seen as the combined, unexpected but theoretically predictable result of design weaknesses in institutional and regulatory arrangements and changes in financial technology.

From this vantage point, the near collapse of the financial system resulted from:

- Pro-cyclical effects of capital regulations under fair value accounting standards,
- Explosive growth of outstanding derivative contracts, especially credit default swaps and
- The redistribution of housing finance risks (especially sub-prime) across financial institutions on a global basis, facilitated by securitization.

Together, these factors combined to create a time bomb. That it exploded is no market risk event, but rather a failure of risk management.

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The explosion could have been anticipated. Had CROs not abdicated their responsibilities to rating agencies and conducted appropriate due diligence, toxic securities would not have found their way to their balance sheets. Similarly, fundamental changes in the characteristics of mortgage products and the creditworthiness of the customer base should have been examined closely. Such examination would have diminished the attractiveness of CDOs as investments, have reduced their spread throughout the financial system and have prevented or reduced the losses of capital that caused confidence to collapse and market liquidity to vanish.

Insurers, however, did not understand that risks to the financial system were elements of their strategic risk. Strategic risk elements embedded in the financial system are difficult to mitigate. They create dependencies among businesses that undermine diversification benefits achieved through underwriting of a multiplicity of risks and exposures. They have a tendency to hit all activities at the same time.

In this area, prudence is the source of wisdom. Companies that have had the discipline not to underwrite exposures that they did not understand, or invest in financial instruments or asset classes that they could not assess to their satisfaction (e.g., tranches of securitization backed by sub-prime mortgages), have withstood the crisis comparatively well. Some of these companies are benefiting from the weakness of their less thoughtful and less disciplined competitors. For example, Warren Buffett's decision to create a financial guaranty insurer recently and to resume investing in U.S. companies appears perfectly timed to capitalize on opportunities created by the weakness of established competitors and the steep fall in the market value of many companies.

Methodologies for identifying, measuring and managing strategic risks are in their infancy. Since there are no established conceptual frameworks to guide analysis and

decision making, building resilient portfolios of insurance businesses and protecting them from strategic risks is a challenge. In their oversight roles, directors and CEOs can help company executives by re-examining the appropriateness of traditions, conventions and modes of thought that influence risk assumption decisions.

They should demand that company management:

- Conduct periodic defensibility analyses of their companies' business models and strategy, including consideration of weaknesses in institutional arrangements of the financial system. Such strategy review must also focus on the identification and monitoring of emerging trends with adverse effects on competitive advantage and pricing flexibility (loss of business to competitors, emergence of new risk transfer technologies or product innovations, regulatory developments, etc.) that can reduce company valuations sharply and rapidly.
- Reassess periodically the company's strategy for controlling performance volatility and achieving a balance between risk and return through specialization in risk assumption, diversification (e.g., across lines, industries, regions or countries), ceded reinsurance or structural risk sharing and financing vehicles such as captives or side-cars.
- Assess the possibility for disruption of business plans caused by events that reduce capital availability or flexibility in capital deployment.
- Develop appropriate responses through adjustment in capabilities, redeployment of capacity across lines of activity, change in limits offered, exclusions, terms and conditions, ancillary services provided, lobbying of lawmakers and regulators and participation in industry associations.
- Hold executives accountable for discipline in underwriting and investment decisions.

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Because the insurance industry has been highly regulated, many insurance companies have not developed a deep strategic risk assessment capability. They need one urgently.

#### Holding Sufficient Capital

The issue of how much capital an insurance company should hold beyond requirements set by regulators or rating agencies is contentious. Many insurance executives hold the view that a company with a reputation for using capital productively on behalf of shareholders would be able to raise additional capital rapidly and efficiently, as needed to execute its business strategy. According to this view, a company would be able to hold just as much “solvency” capital as it needs to protect itself over a one-year horizon from risks associated with the run off of in-force policies plus one year of new business. In this framework, the capital need is calculated to enable a company to pay off all its liabilities, at a specified confidence level, at the end of the one-year period of stress, under the assumption that assets and liabilities are sold into the market at then prevailing “good prices.” If more capital were needed than is held, the company would raise it in the capital market.

Executives with a “going concern” perspective do not agree. They observe first that solvency capital requirements increase with the length of the planning horizon. Then, they correctly point out that, during a crisis, prices at which assets and liabilities can be sold will not be “good times” prices upon which the “solvency” approach is predicated. Asset prices are likely to be lower, perhaps substantially, while liability prices will be higher. As a result, these executives believe that the “solvency” approach, such as the Solvency II framework adopted by European regulators, understates both the need for and the cost of capital. In addition, they remember that, during crises, capital can become too onerous or unavailable in the capital market.

They conclude that, under a going concern assumption, a company should hold more capital, as an insurance policy against many risks to its survival that are ignored under a solvency framework.

The recent meltdown of debt markets, however, made it impossible for many banks and insurance companies to shore up their capital positions. It prompted federal authorities to rescue AIG, Fannie Mae and Freddie Mac. The “going concern” view appears to have been vindicated.

Directors and CEOs have a fiduciary obligation to ensure that their companies hold an amount of capital that is appropriate in relation to risks assumed and to their business plan. Determining just how much capital to hold is fraught with difficulties, however, because changes in capital held have complex impacts about which reasonable people can disagree. For example, increasing capital reduces solvency concerns and the strength of a company’s ratings while also reducing financial leverage and the rate of return on capital that is being earned; and conversely.

Since directors and CEOs also have an obligation to act prudently, they need to review the processes and analyses used to make capital strategy decisions, including:

- Economic capital projections, in relation to risks assumed under a going concern assumption, with consideration of strategic risks and potential systemic shocks, to ensure company survival through a collapse of financial markets during which capital cannot be raised or becomes exceedingly onerous
- Management of relationships with leading investors and financial analysts
- Development of reinsurance capacity, as a source of “off balance sheet” capital
- Management of relationships with leading rating agencies and regulators
- Development of “contingent” capital capacity.

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The integration of risk, capital and business strategy is very important to success. Directors and CEOs cannot let actuaries and finance professionals dictate how this is to happen, because they and the risk models they use have been shown to have important blind spots. In their deliberations, directors and CEOs need to remember that models cannot reflect credibly the impact of strategic risks. Models are bound to “miss the point” because they cannot reflect surprises that occur outside the boundaries of the closed business systems to which they apply.

#### Aligning Interests of Shareholders and Managers

Separation of ownership and control creates conflicts of interests between managers and owners. To mitigate this situation, companies expend much effort to develop and implement incentive compensation systems that align the interests of managers and shareholders. The present crisis demonstrates clearly that such arrangements are imperfect: large incentive payments were made to many people in companies that have performed poorly or even failed. There has been a public outcry.

But there is nothing really new in misalignments of incentives, or weaknesses in incentive designs that produce harmful results: they exist in every company to some degree. In a typical situation, managers are concerned about minimizing financial and career consequences of not achieving their objectives. If the situation requires it, managers will exploit every opportunity to change their operating plans to achieve their targets. They will seek and capitalize on opportunities to convert unreported intangible assets, such as market share, product or service quality, product leadership, plant productivity or customer service responsiveness into current profits by postponing and reducing related expenses. Financial results will look good, and they will be praised for accomplishing their objectives. Actions that they took, however, accelerated uncertain future income to the present period while undermining the company’s competitive capabilities and reducing the sustainability of

its performance. This is dangerous. Mitigating this form of moral hazard is difficult because its effects are not readily apparent.

In insurance companies (and banks), business managers have even greater opportunities to “game” incentive plans: they can increase reported business volume and profit in the current period by slightly underpricing or increasing risks assumed. This approach to “making the numbers” is particularly tempting in lines of coverage in which losses can take many years to emerge and develop; it is also particularly dangerous because losses from mispriced policies, especially in lines with high severity/low frequency loss experience, can be devastating. Similarly, investment officers can invest in assets that offer higher yields to increase portfolio performance, while involving risks that can result in significant capital losses later.

Based on these observations, Directors and CEOs of insurance companies need to work with management to:

- Link incentive compensation payments to the ultimate outcome of business written rather than to current profits (especially when fair value accounting standards cause immediate recognition of profits on contracts).
- Establish and empower an internal control and audit function to verify that managers’ actions are aligned with business strategies and plans.
- Verify the integrity of underwriting and investment decisions, in relation to explicitly approved guidelines and processes.

The present crisis has demonstrated how unbundling of risk assumption businesses can increase moral hazard by redistributing risks, gains and potential losses across originators, arrangers of securitization transactions and investors/risk bearers.

Reconstruction of incentive programs and establishment of appropriate oversight and enforcement mechanisms are needed to reduce moral hazard and restore confidence

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in the financial system, including insurance companies.

Regulators, rating agencies, investors, clients, politicians and citizens will be watching.

Conclusion

In the aftermath of the present crisis, directors and CEOs of insurance companies should demand that management enhance the effectiveness of ERM frameworks and processes. Greater progress will be accomplished by companies in which directors and CEOs work with management to:

*Note: See “Increasing the Usefulness of ERM to Insurance Companies,” by Jean-Pierre Berliet, in the newsletter of the Joint Risk Management Section of Society of Actuaries, Casualty Actuarial Society and Canadian Institute of Actuaries, August 2008 and at: <http://www.soa.org/library/newsletters/risk-management-newsletter/2008/august/rmn-2008-iss13.pdf>*

- Add a strategic risk management component to capital deployment and risk management processes,
- Increase capital held to support the value of their companies as “going concerns” and
- Reshape incentives to align interests of shareholders and managers.

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## Against the Grain: The Wisdom of Countercyclical Capital

by Anson J. Glacy, Jr.

Over the past two decades, capital regimes for financial intermediaries have evolved from simple, static estimates toward dynamic, risk-based methodologies that reflect the real nature, extent and mix of risks to which an organization is exposed. This evolution is undoubtedly a good thing, helping companies maintain capital in proper proportion to risk and, hopefully, stay solvent through extreme conditions.

However, these new ways of calculating capital requirements are relatively untested. We may be witnessing the results of such a test today. As of this writing, the global economy is almost surely entering a serious recession. One of the reasons for this appears to be inadequate capital provisioning. The failure of capital regimes to protect financial entities (and, by extension, their customers) has had unfortunate effects on the markets and economies of the world.

One contributory theory for why this happened is that today's capital regimes measure risk based on prevailing market conditions. Bull markets with low volatility levels and upward trajectories are taken to indicate conditions of low risk. In these conditions, capital requirements fall. Bear markets with high volatility and falling prices are taken to indicate conditions of high risk. In these conditions, capital requirements rise.

Taken as a whole, this approach to capital is procyclical: it intensifies economic swings, enabling companies to take greater risks when times are good and restricting their options when times are bad. This is being seen today as companies facing severe balance sheet losses and asset depreciation are simultaneously told to post draconian levels of capital—achieving precisely the opposite of capital's intended effect.

### Value at Risk Puts the Economy at Risk

An economic approach to the establishment of capital is based on measuring the calls upon capital resources that could happen under extreme events, the proverbial “tail” of the distribution. Today's evolving risk-based capital re-

gimes (like Basel II and Solvency II, the European directive on insurers' capital adequacy effective in 2012) use the notion of value at risk (VaR) to make those establishments.

VaR-based capital implementations typically involve large, multivariate, normally distributed model components. Correlation factors are applied to reflect risk-factor associations but usually are stationary across the event space. The institution sets a benchmark probability of ruin, based on a desired level of financial strength, aligned with rating agency standards for a target rating. Capital is then set based on quantile statements about ruin: a given level of capital assures a 99.5 percent probability of continued solvency, for example.

Equity market volatilities (like the CBOE Volatility Index®, or VIX®) often used in VaR reckonings exhibit a well-known inverse relationship to the general levels of the stock market. Capital estimations based on these measures change as market conditions change—in precisely the wrong direction. Capital amounts based on these volatilities will tend to shrink as markets advance. This improves the return-on-economic-capital profile of an intermediation business, promotes the application of leverage and motivates management to sell more business. One could also say it adds fuel to the fire. In effect, VaR tells us, “Right now, things look pretty good, so go ahead and make big bets.” The problem is that “right now” is not the appropriate time horizon for measurements of risk.

In fact, some have criticized Basel II from the beginning for enshrining pro-cyclical capital estimation methods. They point out that it establishes VaR-like capital levels by incorporating market-implied volatilities, requiring too little capital during economic upswings and too much during recessions. Instead of restraining lending during exuberant times, false asset bubbles are created that end in tears.

In the Solvency II framework, the minimum required capital is prescribed to be at the 99.5 percentile (i.e., one failure every 200 years). Assuming normality...

*Against the Grain: The Wisdom of Countercyclical Capital by Anson J. Glacy, Jr.*

$$\text{Required Capital} = \Phi^{-1}(0.995) = 2.58\sigma$$

...where  $\Phi$  is the normal distribution function and  $\sigma$  estimates variability of company economic outcomes. The multiplier factor of 2.58 means that required capital expands and contracts at more than twice the rate of business risk. At the 99.95th percentile (one failure every 2,000 years) the capital multiplier is 3.29. Thus, small reductions in estimations of  $\sigma$  under the Solvency II framework can free up outsized amounts of capital.

Reversing the Thrusters: Implementing Countercyclical Capital

In fact, an opposite approach—one that is countercyclical—might serve us better. Countercyclical capital measures risk based on a more expansive time horizon than does VaR. For example, if financial intermediaries were required to evaluate loss potential by considering performance over the entire economic cycle, they could establish capital levels that counteract cyclical forces. This approach is consistent with a recognition that financial risk actually arises at the inception of a loan or insurance policy and lasts for its entire lifetime. So, instead of a market-implied measure of  $\sigma$  one could either reflect real-world risk dynamics observed over a full-cycle historical period or a rolling average of recent observations.

When times are good, companies can afford to hold excess capital on their balance sheets and have the resources to build it up. In effect, they should be saving for a rainy day. When the rain comes, companies need to spend down capital to protect themselves from ruin. During the middle part of this decade, risk spreads contracted to levels that made the intermediation business difficult. It seemed that all financial assets became “priced to perfection.” The search for alpha became a consuming obsession for companies as they sought the slivers of a basis point necessary to keep their business models afloat. In the United States, leverage came to the rescue as the Federal Reserve graciously assisted in enhancing the risk/reward profile of an intermediation business through aggressive “bubble” management efforts.

A countercyclical capital regime would have restrained the over-reach during these times of tight risk spreads, making a whole raft of marginal intermediation projects uneconomic and therefore undone. At the same time capital would have been banked that could be of good use right now in arresting the de-leveraging spiral. Put simply, the good times would not be quite as good—but the bad times would not be nearly as bad. Few observers of today’s economic turmoil would argue that a dose of such moderation is a bad thing.

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RISK MANAGEMENT: The Current Financial Crisis, Lessons Learned and Future Implications

## Prudent Enterprise Risk Management Strategy: Aligning Incentives

Reaffirming Your Company's Commitment to ERM in Light of the Financial Crisis  
BY PRAKASH SHIMPI

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## Reaffirming Your Company's Commitment to ERM in Light of the Financial Crisis

by Prakash Shimpi

The current financial crisis underscores the need for companies to take a sobering look at their approach to risk management. Among the many lessons to be learned, one is immediately clear: The subprime debacle represents a failure in risk management, rather than a failure of risk management.

While we are still in the midst of the crisis and there may be other shoes still left to drop, some general views are already emerging. There are many reasons why we are in a crisis, but inadequate risk management practices feature high as a contributory factor. Clearly, improvements need to be made, and we see three aspects of enterprise risk management (ERM) implementation that should be strengthened. First, far from being a compliance exercise, risk management is a strategic imperative and should be treated as such. Second, financial managers should urgently reassess the adequacy of their current risk management capabilities in order to do so. Finally, the greatest shortcoming is cultural; management should improve the engagement of employees, as well as the board and senior executives responsible for risk management.

### Finance Executives' Viewpoints

Towers Perrin conducted two surveys in 2008 that provide a fact base for the conclusions and recommendations discussed here. The first study was a cross-industry survey of 125 top U.S. finance executives<sup>1</sup> conducted during the week of September 22, just as the first U.S. Treasury bailout plan was heading for legislative approval. The second study was a global survey of over 350 top finance executives in the insurance industry,<sup>2</sup> the fifth in a series of biennial insurance industry ERM surveys, which was conducted during May and June 2008, as the crisis was brewing.

Finance executives in the cross-industry survey reported that improving their own companies' risk management was a priority, even ahead of short- and long-term access to capital. In fact, only 4 percent of respondents feared the current financial meltdown would have a severe impact on their companies' financial prospects. However, 72 percent of respondents expressed concern about their own companies' risk management practices and ability to meet their strategic plans.

These survey findings indicate a renewed resolve on the part of financial executives to invest in more effective risk identification, measurement and management procedures. Moreover, 42 percent of the respondents also predicted greater involvement in risk management policies on the part of boards of directors as well as increased employee-level involvement.

When asked to lay blame for the current financial crisis, 62 percent of the cross-industry survey respondents pointed to poor or lax risk management at financial institutions as the single greatest contributor. Other major causes included increased complexity of financial instruments (59 percent), financial market speculators (57 percent), predatory lending practices (50 percent) and incentive compensation practices in the financial services sector (44 percent).

As executives take a closer look at their own risk management practices, one problem they are likely to find is incomplete, slow or uneven application of ERM. Our insurance industry survey found that only a small fraction of companies around the globe can claim to have fully implemented ERM into their culture.

Within the insurance industry, embedding ERM into business processes is proving to be a challenging mis-

<sup>1</sup> *Senior Finance Executives on the Current Financial Turmoil*. A report prepared by CFO Research Services in collaboration with Towers Perrin. November 2008. [http://www.towersperrin.com/tp/getwebcachedoc?webc=USA/2008/200811/TP\\_Financial\\_Crisis\\_Survey\\_Report.pdf](http://www.towersperrin.com/tp/getwebcachedoc?webc=USA/2008/200811/TP_Financial_Crisis_Survey_Report.pdf).

<sup>2</sup> *Embedding ERM — A Tough Nut to Crack*. Towers Perrin. October 2008. [http://www.towersperrin.com/tp/showdctm.doc.jsp?country=global&url=Master\\_Brand\\_2/USA/News/Spotlights/2008/Oct/2008\\_10\\_28\\_Spotlight\\_Embedding\\_ERM.htm](http://www.towersperrin.com/tp/showdctm.doc.jsp?country=global&url=Master_Brand_2/USA/News/Spotlights/2008/Oct/2008_10_28_Spotlight_Embedding_ERM.htm).

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sion. For example, economic capital (EC), a robust metric for making risk-based decisions, has become increasingly important to regulators and rating agencies over the last two years. However, more than half (55 percent) of survey respondents believe that substantial work is needed before they can use EC to guide risk-based decision making, and 60 percent noted that considerable strides must be made before they can link EC metrics to performance management. Only 10 percent of the firms responding said they have appropriate EC capability fully in place. More than 40 percent said they remain focused on getting the basics right in their EC calculations. But in spite of the slow pace of embedding ERM, significant numbers of respondents indicated their ERM programs have already resulted in key business changes in risk strategy or appetite (36 percent), asset strategies (35 percent) and product pricing (31 percent).

More and more companies are beginning to recognize the importance of managing their entire risk landscape, not just those risks that are familiar or easy to quantify. One particular problem area is operational risk. According to the survey, only 7 percent of insurers believe they have appropriate operational risk capability in place, while 37 percent admit significant work is still required. Yet despite these admissions, operational risk ranks only seventh among survey participant priorities. Of those companies that have set limits to govern day-to-day risk taking, over 70 percent have limits for market, credit and insurance risk, but just 26 percent have limits for operational risk.

### Strengthening ERM Implementation

Based on these surveys and discussions with finance managers in a variety of industries, the commitment to ERM remains strong, and there is increased urgency to strengthen ERM implementation. Although there are many ways to do this, we have identified three areas of focus and recommend specific actions within each area that require immediate attention.

#### 1. Treat ERM as a Strategic Imperative

If ERM is to be truly integrated with how firms are managed, then implementation must begin with active engagement of the firm's board and senior executives.

*Reinforce the role of the chief risk officer.* This is the single most important action that a company can take to recognize ERM as a strategic imperative. Many companies have appointed a senior executive (chief risk officer, CRO) to oversee risk management. The current financial crisis has shown us that merely making such an appointment is not sufficient. If, as we believe and our surveys indicate, ERM is viewed as critical to the survival and profitability of a firm, then the CRO's responsibility must be commensurate. Studies have shown that problems arise when risk management does not have a seat at the management table, or when risk management's warnings are ignored, or when risk management is performed unevenly. No doubt, authors and academics writing the history of the current crisis will find evidence of all three.

The current validation of the risk management function could result in a dramatic improvement in corporate prestige. Just as a CFO has a specific set of responsibilities, we may soon see a convergence of responsibilities that are aligned with the CRO. Indeed, these new responsibilities may require the establishment of new professional standards and levels of experience for future CROs. As stakeholders come to realize the importance of risk management, CROs may see their professional and fiduciary obligations increase. And, as regulators and the financial industry seek ways to prevent past mistakes, risk managers will likely play an increasingly important public policy role.

*Increase board engagement on risk.* We expect that boards should and will demand better metrics and information about risk management performance. Not only will the board's level of questioning dig deeper and be less satisfied by traditional compliance or audit reports, the questioning

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will place a premium on verifiable evidence of employee involvement. We anticipate a significant increase in the number of board-level risk oversight committees, and we expect that their scope of oversight will be broad.

*Align incentives to reflect risk.* Although this has been a topic of discussion for some time, the current crisis has demonstrated that compensation practices can be at odds with managing risk appropriately. We believe that compensation programs will undergo a transformation as companies attempt to rid themselves of inducements to exceed stated risk tolerances. We expect the scrutiny of incentive compensation programs, historically left to policymakers and investor groups, will come increasingly from boards of directors and fellow managers, who are loathe to share the fate of companies that have failed in the wake of this crisis.

### 2. Improve Your ERM Capabilities

Companies need a variety of skills, methodologies, tools and processes to manage risk appropriately. Each of these is probably worth reassessing in the current environment to identify and overcome any significant shortcomings. If one of the aims is to add up all the bits to develop a view of aggregate risk exposure across the firm, then two issues need urgent attention.

*Recognize operational risk as material.* In our experience, there is a fundamental disconnect between the way institutions view operational risk and the way operational risk management should be implemented. To a large extent this may occur because the term operational risk conjures up images of day-to-day processing errors. These minor operations issues are often only a small part of operational risk, which is driven in large part by catastrophic failures in management (e.g., inappropriate sales practices or unauthorized activities). Data shows that a significant number of corporate bankruptcies and insolvencies during the past 20 years have been caused by operational failure. Indeed the current financial crisis can be viewed as a failure of operational risk management at so many levels.

*Fungibility should be stress-tested.* One lesson made clear from AIG's collapse is that capital and cash are not fungible within the different parts of a conglomerate financial institution. Legal and regulatory restrictions limit the flow of capital and cash between legal entities within an enterprise. Even if the needed funds were available, these restrictions would have prevented AIG from dealing with its problems. Some type of fungibility testing has been suggested within the Solvency II framework, and its potential value to risk management is now evident. Understanding the limits of capital and cash flow between legal entities within the same organization is vital.

### 3. Understand and Manage Your Risk Culture

At the end of the day, good risk management results from people doing the right thing. It is not sufficient for ERM to impact only a few people at the top of the organization, nor should it be put on the shoulders of employees without proper guidance.

*Establish clear guidance on accountability.* Much has been said about setting the right "tone at the top" for ERM. Companies still have a long way to go to do that in a way that is clear and engaging to employees. A starting point may be to articulate a company's mission, vision and values as well as its risk strategy and objectives. Ultimately, though, it is management's own actions in holding people accountable in a way that reinforces the alignment of interests of employees, management and other stakeholders that will make a difference.

*Assess your risk culture regularly.* In order to make a difference in employee engagement, management needs to determine whether management's impression of the company's risk culture is borne out by rank-and-file opinion. Employee risk awareness and engagement should be assessed regularly to identify gaps between management expectations and employee understanding, with appropriate measures undertaken to bridge the divide.

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These three aspects of risk management and supporting recommended actions were put forth with the view that had such practices been more firmly established, perhaps we might not be in the midst of such a severe financial crisis. It is the actions we take now that can help us prepare to navigate the complex and inherently risky world of the future.

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## A Tale of Improperly Placed Incentives

by Sam Gutterman

Arguably, many of the fundamental contributing factors to the 2008 mortgage crisis involved misdirected incentives and misinformation available to key participants in the housing finance process. The incentives discussed here include those of the mortgage holders, mortgage intermediaries, mortgage providers, securitizers, raters and CEOs and other highly paid staff of those involved. Unless similar incentives are recognized, future public policy decisions will again fail to avoid this system-wide risk. Since I am most familiar with the U.S. situation, my comments will be limited accordingly.

It has been U.S. public policy to facilitate and help enable home ownership for as many people as possible. This commendable policy objective has been promoted through full or partial mortgage loan warranties provided by pseudo-public entities [such as the Federal National Mortgage Association (Fannie Mae), and the Federal Home Loan Mortgage Corporation (Freddie Mac)], public entities (including federal agencies or departments such as the Federal Housing Administration and the Department of Veterans Affairs), private mortgage insurers, and through the securitization of mortgages. These insurance or financial vehicles have provided financial support to lenders through which mortgage loans might be marketed to a wider market than might otherwise have been achieved by individual lenders. Unfortunately, at the same time, these have led in part to unintended consequences, what in retrospect could be considered to be misguided subsidies to the housing market.

Especially since 2004, the view that recent housing value inflation would continue at a rapid double-digit rate of growth was widely held and encouraged speculative excesses from two types of mortgage purchasers: (1) investors who purchased multiple residences under the assumption that buying and selling these properties at very little investment or initial cost could be very profitable by an expectation of flipping them quickly, without incurring much if any personal financial risk or even to put

much if any investment, and (2) purchasers who did not have the current financial capacity to repay their mortgage loans, taken out for houses whose values had been bid up in a housing value bubble. Some of the latter mortgages, issued to those with limited financial resources or weak loan experience (often referred to as sub-prime mortgages), were to some the underlying source of financial chaos. However, I believe that they were one source of the underlying problem, with an overall credit problem covering a much larger percentage of the population.

Mortgage products that were designed and actively marketed to these individuals enabled and encouraged mortgage purchases. These included mortgage contract features such as teaser loans (with extra-low interest rates for an initial period), interest only loans, loans equal to or even in excess of current house value and adjustable rate loans. Some of these became quite popular because they got around financial regulations, such as banks' capital adequacy formulas.

Some have blamed loose underwriting standards, or even lack of standards, on broader access to credit. Too many people with inadequate financial resources were encouraged to take out excessive mortgages for their houses when housing values were at their peak. Loans were issued on the basis of no financial documentation (no doc loans), limited financial documentation (low doc) mortgages, and in some cases as a result of fraud. These factors in turn helped fuel the housing bubble.

What motivated mortgage intermediaries and lenders to offer these loans to these markets? Although it is all too easy to attribute their actions to simple greed (and, of course, there was a little of this) in taking advantage of an enthusiastic market; in part, a long period of low inflation and economic stability reduced investors' perceptions of risk.

From the view of the lending institutions, a relatively large up-front profit could be obtained accompanied by what seemed to be limited or no cost or risk. This

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incentive to increase market share seemingly without adding risk promoted bad business practices. Although in many respects similar tendencies existed in prior housing finance cycles, they were exacerbated here by the existence of vehicles that appeared to pass risk to others—so underwriters took inadequate precautions to ensure that only appropriate mortgage loans were taken on. It was further exacerbated by the extensive use of Wall Street computer models based on recent price histories.

The availability of pass-through vehicles, be they through securitization or special purpose vehicles that did not need to be consolidated, either of which could avoid capital charge requirements, seemed to provide profit without risk—rarely possible in a competitive environment. Investors desperately seeking any additional yield eventually led to a bonanza in mortgage-backed securities that not only helped create a glut of new homes, but ultimately led to an inability to sell homes in foreclosures in some areas that further led to the downward housing price spiral.

Although seemingly sound risk management practice existed at the entity level, in retrospect there were reasons why inadequate charges were being made. Inadequate risk assessment and transparency, accompanied by systemic financial risk that proved ultimately to be unavoidable, led to huge prospective costs foisted on the entire system. In part this was due to a lack of individual risk-bearing, a feeling of not being responsible, that ultimately created huge moral hazard (in this case provided incentives to create risk where none existed). Should (or rather can) this be eliminated in the future?

Two further contributing factors need to be highlighted: (1) an overemphasis on short-term thinking and (2) the typical human tendency to assume that current trends will continue. These are closely interconnected, although the former can be also viewed as equivalent to the application of very large discount rates. These factors have been at the root source of most housing bubbles, as they also have been a factor for most underwriting cycles in insurance.

Those who bought the mortgages were banking on the continuation of the rapid increase in housing values. Those who sold the mortgages thought that, since they didn't have to bear any downside risks and as long as the next level in the risk chain also continued to believe that housing value trends would continue, the greater volume generated through more creative debt and derivative products would enhance overall income.

Will such products and underwriting ever be seen again? Well, it is too early to look ahead to the next time the housing finance cycle reaches this stage, but similar variants, possibly with different names, are likely occur. Or similar trends will arise in other areas (e.g., credit card loans and mortality). But it is likely that if short-term thinking and current trend extrapolation occur in other areas, the same type of situation will arise.

#### Recommendations

Future systemic risks need to be better identified and assessed. One example is to ensure that more stakeholders bear some of the cost or keep some of the risk; otherwise moral hazard will become significant (simply passing the risk along, providing through fixed fees the incentive to write business at a loss).

Better financial education is needed for various participants and stakeholders in the system, education that reflects both short-term and long-term incentives and views. This need not only exist for potential mortgagees, but also for executives and compensation consultants. Effective corporate governance will listen to risk management teams that involve actuaries. A populist solution inevitably points a finger to CEO and executive compensation—indeed, overemphasis on short-term features of such compensation may have contributed to the damages caused; more long-term performance incentives should be featured in compensation formulas.

Policymakers need to better assess the unintended consequences of their actions. Financial service regula-

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tors need to increase (risk-based) capital requirements for pass-through vehicles or require that an underwriter keep a minimum percentage of each risk written to avoid off-loading 100 percent of the risk for the entity who performs the underwriting and product design offering.

Modelers should pay more attention to outlier possibilities, using more robust stress-testing whose results are not ignored as being impossible. They should also avoid an overemphasis on recent experience when dealing with potentially cyclical phenomena.

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## Risk Management: The Current Financial Crisis, Lessons Learned and Future Implications

by Neil Bodoff

Various ingredients contributed to the current financial crisis, and we can learn many lessons from the crisis. Yet rather than myopically focus on the particular minutiae of the current circumstances, we ought to pay special attention to those central issues that underpin the current crisis, past crises and future crises.

I believe that the central issue that underlies the current crisis and many others is how one measures profit. Specifically, the current crisis derives from the lack of “risk adjustment” when reporting profit; a key reform crucial to mitigating future crises is to ensure that we always measure profit on a “risk-adjusted basis.”

Measuring profit on a risk-adjusted basis is critical in both of the following contexts:

1. When measuring profit for external communication to shareholders and others.
2. When measuring profit for internal compensation calculations.

There are two critical reasons for measuring profit on a risk-adjusted basis:

1. It provides more meaningful information about profit ability.
2. It reduces the incentive to take excessive risk in order to increase profits.

Currently, a firm reports its profits to external audiences without any risk adjustment; thus the firm’s financial statements do not reflect the level of risk the firm undertakes in order to achieve these profits. As a result, many groups that rely on financial statements, such as investors, lenders, credit rating analysts and regulators, can be blindsided when a firm’s steady, long-term profits suddenly invert to sudden, catastrophic losses; reporting risk-adjusted profit, however, highlights the extent to which a firm’s profits derive from taking risk.

In addition, how a firm measures profit usually affects how the firm compensates its key employees; in turn, a firm’s compensation system directly affects employee incentives for risk taking. Therefore, a firm that does not adjust for risk when measuring profit for internal compensation purposes creates powerful incentives for excessive risk taking. On the other hand, when a firm measures profit for compensation purposes on a risk-adjusted basis, there is less of an incentive for employees of the firm to take excessive risk, because increased risk does not automatically lead to the potential for increased compensation. Shareholders, creditors, rating agencies, regulators and taxpayers all have an interest in ensuring that a firm’s compensation system does not generate structural incentives for future excessive risk taking.

The proposal to measure profit on a risk-adjusted basis would likely require major changes to accounting standards and financial statements, certainly no simple task. Moreover, it would also likely require substantial changes in the compensation systems of many firms, another difficult challenge. Most broadly, it would require changes in the underlying intellectual framework, psychology and embedded practice of current methods of measuring profit. Ultimately, the task of measuring profit on a risk-adjusted basis would be quite a challenge, but this reform has the potential to preemptively undermine the perverse incentives for excessive risk taking and, as a result, reduce the likelihood and severity of future financial crises.

## Prudent Enterprise Risk Management Strategy: Managing/Matching Authority and Accountability

Recent Crisis: Roots and Lessons  
BY STEPHEN MITCHELL AND JOHN F. MCGARRY

There Is No Free Lunch  
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## Recent Crisis: Roots and Lessons

by Stephen Mitchell and John F. McGarry

Risk management lessons abound from the current crisis. Understanding the lessons requires a clear assessment of the roots of the crisis. A simplified assessment of the underpinnings of the crisis sheds light on pivotal mistakes and offers valuable learnings.

### Roots

The roots of the crisis are understood, on a simplified basis, by three L's:

- Lack of accountability
- Leverage
- Liquidity

Lack of accountability is most evident in the fundamental changes in the mortgage market in recent historical periods.

Historically, people requiring mortgages sought their mortgages from local institutions that would conduct the evaluation and hold the risk. Loan officers of these institutions were accountable for the outcomes of their decisions—defaults were a direct reflection on their judgment. In recent periods, mortgage originators abound. In this model, the originators create the mortgage and then send it to other institutions for holding. Originators are compensated on the volume of mortgages created, but are not impacted by the end outcome relative to default.

Historically, people sought mortgages to buy a primary residence—the clear intent being long-term occupancy. In recent times, based on a protracted period of increasing property values, people sought mortgages to fund investment properties. “Flipping houses” has become a popular income and investment strategy, as well as a national past time. As a leveraged investment financing vehicle, mortgages create an updated set of “walk away” rules. While people do not vacate their primary residences in periods of property value declines, investors will abandon their interest (“turn in the keys”) when the investment does not produce value. Walking away is rational economic behavior given the altered nature of the interest of the property and the use of the mortgage.

The impacts of these changes in the fundamentals of the mortgage market were further magnified by expansion of mortgage availability with regard to terms (e.g., interest-only payment patterns, less money down) and creditworthiness of applicants.

Leverage was a second key factor. Institutions guaranteed mortgages against default. Based on historical experience, only small amounts of money, typically measured in terms of basis points, were required by the companies accepting this risk. This left institutions exposed to guaranteeing large sums of money based on comparatively little income.

There were two primary problems with this approach. First, many of the institutions failed to evaluate the potential risk and hold reserves or capital against any material differences from historical default rates and patterns. Second, insuring institutions often failed to recognize the changing dynamics noted above and the conditions they created for significantly increased default risk in the event of a downturn in property values.

When the first two L's came together, the third L, liquidity, became a problem. When property values eventually evidenced their inevitable fall, defaults occurred at historically high rates. This led those institutions that had assumed the risk, potentially without appropriate capitalization, to have large and immediate cash needs. Those with cash held onto it, while those without it sold what they could—pressuring values—and borrowed what little they could at high cost. A crisis of liquidity emerged.

### Lessons

Separating authority and accountability seldom results in responsible outcomes. Whenever decision-making is divorced from accountability of outcomes, there is often not enough “skin in the game” to create incentives necessary for parties to expect rational behavior, or at least not to expect historically experienced behavior. When fundamental changes in the mortgage market changed the interest of originators and the “walk away” rules of mortgage holders, the change in accountability had profound results.

Recent Crisis: Roots and Lessons by *Stephen Mitchell and John F. McGarry*

The lesson of accountability has continued applicability in many areas. We should continue to be on guard for elements of the financial markets that may not evidence a crisp relation between authority and accountability. We should also look at our own organizations and institutions to be sure that the individuals we rely on for decisions in sales, service, management and professional ranks have the interest in the outcomes necessary to drive rational behavior.

Secondly, it is a refreshed truism for us from the crisis that nothing lasts forever. Markets can begin to behave as if a trend, such as increasing housing values, will go on forever. Any system that is geared to function only when values or trends move in one direction is surely doomed to failure.

As we step into the future, we need to be on guard for any system of business or financial strategies or behaviors that is based on the fundamental tenet that a certain trend will continue indefinitely. The best strategies are both

resilient under a variety of circumstances and adaptable to change.

Focusing on fundamentals never goes out of style. The evaluation of defaults was guided by history. An evaluation of the changes sweeping the origination of the mortgages and the profile of their holders should have revealed a different picture. Institutions that should have been expert at managing financial risk failed to fairly assess and provide provision for adversity.

Looking through assessments provided by others and constantly challenging our understanding of the dynamics around us is critical. In a world of increasing volumes of collateralized securities and derivatives, it is hugely important to look beyond the wrappers to the base assets and behaviors. The sum may indeed be different than its parts.

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## There is No Free Lunch

by Daniel C.F. Hui

Investing for insurance companies in the United States and Canada is a balancing act. There are numerous restrictions on allowable investments. Portfolio yield is very important, because insurance companies are relying on the investment returns to supplement the operating income. Since the burst of the Internet bubble in 2001, the interest rates fell and stayed low for a number of years. Finding higher yielding fixed income instruments is a tough act as highly liquid instruments tend to provide lower yields than longer-duration assets in a normal interest rate environment. Too much liquidity will drag down portfolio yield.

Mortgage-backed securities (MBS), asset-backed securities (ABS) and their derivatives like collateralized debt obligations (CDO) or CDO-squared provided a welcome respite for institutions seeking higher interest income in the low interest rate environment. Some of these securities and derivatives were marketed as AAA-rated instruments with higher coupons than comparable treasuries. Some firms bought truckloads of these instruments because higher yields were hard to resist, and AAA-rated securities are considered safe investments, aren't they?

This crisis first started with subprime loans and quickly morphed into a credit crisis that eventually engulfed a lot of financial institutions around the world. If a AAA were really a AAA, this crisis would probably have been more contained and localized. As the crisis developed, evidence emerged from the shadows that revealed the questionable quality of some AAA-rated MBS or ABS. Subprime loans were the weakest link. As the credit boom came to an end and the economy slowed down further, the Alt-A, prime and credit card loans were also affected. The subprime crisis is only the symptom of a much larger underlying problem. Both consumers and corporations were over-leveraged. In time, we would find that this is not a strictly U.S. phenomenon.

The foreclosure rate of subprime loans started to increase toward the end of 2006. Borrowers with minimal resources were given loans in the credit boom. Mortgage

brokers misrepresented or even forged the income level of NINJA (no-income-no-job-and-asset) borrowers. Additionally, the lower teaser rate of adjustable rate mortgage (ARM) and option-ARM attracted many borrowers with limited resources to invest in a home. As mortgage rates reset while interest rates got higher, these groups were showing signs of stress. The value of MBS, ABS and CDO with subprime exposure was dropping like a stone. Eventually, all securitized products were impacted adversely, and the flow of securitization deals slowed to a trickle.

Underwriting is very important, and actuaries understand that. There are many players in the mortgage securitization market. The investors, who have a direct interest in the performance of the underlying loans and therefore how these loans were underwritten, are far removed from the process. Andrew Davidson of the Andrew Davidson Company suggested that there are six degrees of separation. Investors are left without a clear view or control on how the loans are underwritten. Investors loaded up on AAA-rated MBS, ABS and CDO on the belief that the ratings truly indicated the stated level of credit and that the first loss investors had applied due diligences to the investment process. Trust was misplaced.

The quality of some of the AAA-rated CDO or CDO-squared tranches was questionable as well since BBB ratings could be transformed into AAA using the CDO technology. Indeed, 62 percent of the MBS/ABS tranches that were rated BBB or below were turned into AAA-rated CDO tranches according to an IMF study. This seemed to be a win-win situation for everybody. Now we must ask: Are these securities really AAA-rated?

Securitization is more popular in the United States than in other countries. A glance at the balance sheets of U.S.-based insurers would reveal that this group originates very few, if any, loans now. The Canadian insurers across the border, on the other hand, hold a higher percentage of their portfolio in private placements and commercial mortgage loans than their U.S. counterparts. Further,

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there are Japanese insurers making residential mortgage loans and commercial loans directly. In addition to buying protection, one of the benefits that policyholders could possibly enjoy by buying insurance products is to access the investment prowess of insurance companies. Individual investors generally could not access asset classes like private placements, residential and commercial mortgage loans and commercial real estate. This was the competitive advantage that insurance companies once enjoyed. This is not true any more. Some of these asset classes are securitized in the United States today. Insurers are facing stiff competition from other financial institutions. Securitization has promoted the liquidity in these asset classes but at the same time the opaque securitization scheme has made them vulnerable. When insurance companies originate loans themselves, they can access the creditworthiness of the borrowers and have control over underwriting. Now, investors in MBS, ABS and especially CDO would have no idea about whether the borrowers could repay the loan or not. There is no gatekeeper guaranteeing the loan quality.

Lack of appropriate modeling capabilities and technology presents additional difficulties for investors. MBS with credit default is very complex to model accurately. CDO with multiple sector exposures is even more challenging. Theory and model development has to catch up with the trades happening in the marketplace. There is no recognized and tested model for valuing these securities and derivatives. Sell-side firms have invested a lot in this already. Unfortunately, buy-side firms are lagging far behind.

The market for MBS, ABS and CDO came to a standstill after the credit crunch. Valuing these in an illiquid market is very challenging. Interestingly, actuaries have been valuing illiquid insurance liabilities for decades. It is recognized that assumptions are very important in the valuation process. There are two natural sets of assumptions—a realistic set for pricing and a conservative set for valuation. This is because there is not a single set of

assumptions that can be observed from the market. Solvency is the paramount concern of insurers. Conservatism is necessary to ensure solvency. Pricing and valuation functions are generally staffed separately to ensure that this is carried out.

The subprime crisis is only the tip of the iceberg. As home prices continue to sink lower, more homeowners are saddled with negative equity and are opting to walk away from their investments. The trend of increasing foreclosure rates has since spread to Alt-A and even prime loans. Credit card default is moving higher too. Consumers are over-leveraged, and firms fare no better. The assets that firms thought they once had have either shrunk or are not there any more. There is not much left on the left-hand side of the balance sheet. The corporate default rate is getting higher. CDOs derived from MBS, ABS and corporate securities are losing values. Therefore, firms that sold credit default swaps (CDS) on MBS, ABS or corporates are losing money fast. This cross-product contagion makes it difficult to contain the crisis.

The future of the current originate-and-distribute model is still up in the air. It is clear that securitization has promoted liquidity and enhanced mortgage financing, so it is difficult to imagine getting out of securitization all together. There are proposals to shed more light on the opaque structures and make them more transparent. In any case, the lessons for investors are clear. There must be a gatekeeper to assure the quality of underlying loan portfolios and take responsibility of the underwriting in loan origination. Models, technologies and risk management tools must be strengthened. Investors will need to invest in the capability of analyzing structured financial securities. After all, there is no free lunch.

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## Risk Management: Buyer Beware!

by Dennis Barry

“Beware of geeks bearing formulas.”

—*Warren Buffet, 2008.*

“If it looks like a loan, acts like a loan, and performs (at least in the beginning) like a loan, it’s probably a loan.”

—*Paraphrased from a truism about waterfowl, origin unknown.*

There are certain aspects of the world of finance, and more particularly of the world of loans, that seem obvious if only to the non-professional. For example, any time you lend money, to anyone, there is some risk that you might not get it back. With the possible exception of full faith and credit debts of the United States, every loan carries some risk with it regardless of the borrower, and this risk varies depending on the creditworthiness of the person or institution that is supposed to repay the debt. Bearing that risk requires some sort of capital, both as a legal requirement and as evidence of good sense in lending, but recently we seem to have forgotten the basic relationship between a loan and the capital associated with it. So, let’s review how it should work:

If Institution A makes a loan, a certain amount of capital is required to support that loan. The amount of capital should be related to the likelihood of repayment of the loan.

If Institution A offloads that loan to Institution B, regardless of how that offload is structured, the same amount of capital is still required to support that loan, and possibly more. The provider of the capital may change, but the amount cannot be less than it was before the loan was transferred.

If Institution B breaks the loan up into little pieces and packages the pieces with pieces of other loans it has acquired and then sells the package to Institution C, the same amount of capital is still required to support the original loan, and possibly more. Again, the capital provider(s) may change, but the overall amount cannot be less.

If Institution C, and all the other institutions that end up with pieces of the loan originated by Institution A repackage all or part of their respective shares, recharacterize the resulting whatcha-ma-call-its, rename those same whatcha-ma-call-its, and resell them to Institution D, the same amount of capital is still required to support that loan, and possibly more.

You get the idea. No matter how the original loan is sliced, diced, packaged, wrapped and marketed by anybody, the same amount of capital is still required to support that loan, and possibly more. The provider(s) of the necessary capital may be different, but the total amount of capital associated with the original loan cannot be less. And if, somewhere in the chain, one of the parties **guarantees** the performance of all or part of the original loan, no matter how the guarantee is structured, the same amount of capital, and probably more, is required to support the loan.

Somewhere in the credit default swap assembly line, that little piece of fact was lost, ignored or redefined out of existence. The same is true for the mortgage-backed securities issued by Freddie Mac and Fannie Mae, although in that case perhaps the existence of such a strong connection to the federal government made security seem stronger than it really was. But, at the end of the day, a mortgage-backed security (being backed by mortgages), is only as good as the underlying assets—garbage in, garbage out, as the saying goes. The same can be said for securitized credit card loans, and so on. And if a counterparty that has guaranteed performance of the original loan at the end of this chain turns out to not have the wherewithal to make its promise come true, the whole chain comes apart, as we’ve seen.

The lesson of the current debacle is, or certainly ought to be, that the risk inherent in a financial transaction cannot be made to go away by the mere act of repackaging that transaction and renaming it. For the front end of the process to write rotten loans and then have the risk disappear via the vehicle of someone renaming those loans leads to ultimate financial ruin, as evidenced by what’s going on

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now. The sow's ear is still a sow's ear, despite all attempts to make it otherwise. If the current regulatory structure, coming from whatever regulator(s), allowed some or all of the capital needed to support a loan to disappear just because the original loan has been repackaged and renamed, that is a major regulatory failure. And if current audit procedures and debt-rating processes allowed the same thing, those are failures as well.

Whatever regulation comes out of this mess should focus on this fact. In the scenario above, Institution A should not be able to release the capital attached to that loan until it has regulatory proof that Institution B has that amount of capital set up for the loan, or more. Similarly for Institution C and Institution D and so on all the way through the chain. Moreover, if the repackaging of the original loan, in whatever form, adds risk to the overall chain, then the appropriate level of additional capital must be held as well.

This sort of regulatory approach already exists in the world of insurance. A direct writer may cede reinsurance but may not release either reserves or capital unless the reinsurer puts both on its own books and **is allowed by regulators to do so**. If retrocessions are involved, each ceding company must retain whatever portion of the necessary reserves and capital unless the accepting company agrees to take on the risk, **and is legally recognized as being permitted to do so**. If a reinsurer is not legally permitted to accept a particular piece of reinsurance, other means of security must be provided before the ceding company can be done with that portion of the risk. This approach makes sense and works well, but it doesn't make the system foolproof. There are lots of horror stories involving complex reinsurance pools that failed. Risks get pooled and offloaded in all kinds of packages, and sometimes the accepting company isn't sure of what's going on upstream. However, that's a management failure, not a regulatory failure. It's almost impossible to regulate

stupidity (aka irrational exuberance) without becoming a surrogate, hands-on manager for all regulated institutions. That's not a practical regulatory solution for anyone.

Regulation that requires conservation of capital, and reserves if appropriate, for financial transactions would be a strong first step in preventing a recurrence of what's going on today. No restructuring or recharacterization of a loan, or other transaction, downstream can eliminate the need for the capital originally required. If there are jurisdictional issues, they need to be sorted out as well, but adequate capital for financial transactions must be the bottom line.

A second step might be to require the institutions involved to limit incentive compensation to time frames of at least three years. While any arbitrary time frame would not be risk-free, it is clear that one-year incentives can reward behavior that, over time, might turn out to be unhealthy for all of the institution's constituents. It would be better to remove temptation, to the extent possible, without simultaneously removing all incentive for a company to grow profitably. Three years seems like a suitable period.

A third step, admittedly hard to precisely define beforehand, should bring the auditors and rating agencies into the equation as well. It is hard to imagine that AIG deserved a clean audit opinion as of December 2007, and was broke by the end of September 2008. The same can be said for Merrill Lynch, and many, many others. And the same is true for many securities that were highly rated when they were in fact rotten. No doubt the courts will determine culpability in what has happened recently, but for the future responsibility ought to be clear, unambiguous and enforceable.

We began this essay with a couple of quotes that seemed appropriate to the topic. Let's end with one that summarizes the current situation, succinctly and accurately:

"We have met the enemy and he is us."

—*Pogo the Possum (Walt Kelly), 1970.*

Let's hope we can do better in the future, for all our sakes.

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## Risk Management and the Financial Crisis: Why Weren't We Protected?

by Mike Batty

### The Failure of ERM?

Risk management can be a thankless profession. In bull markets, risk managers are often viewed as wet blankets who, as some might say, “take away the punch bowl just when the party starts getting interesting.”<sup>1</sup> Upon a turn for the worse, people wonder why they weren't warned earlier. Even when successful risk managers limit losses, their recognition is somehow lacking. Maybe it's the loss aversion baked into our psychology, but it can be difficult to find comfort in situations that are merely bad, rather than terrible.

The ongoing financial meltdown has cast a shadow over the entire economy, and caused some to question whether the much-hyped movement of enterprise risk management (ERM) has failed. My answer is, yes, an overarching theme of the credit crisis is a failure of risk management. However, rather than placing all the blame on the risk managers themselves, I look to the breakdown of the entire risk management system. Instead of revealing a fundamental flaw in ERM that will banish it to the annals of academic research, I believe the single most important message from this financial situation is the need for vastly improved risk management capabilities.

### The Making of a Crisis

The story of what has gone wrong with the current financial situation is lengthy. In general, the credit crisis revealed a lack of enterprise-wide risk management, a failure of risk management techniques and, in some cases, an outright disregard for well-informed risk managers.

We know the problems began in the housing market. After 2003, when the prices of homes began to deviate from historical relationships with inflation, income and productivity, a time bomb was created for their collapse. But how did this develop? How did these problems so permeate the global economy? And why didn't we see it

coming? Low interest rates and regulations promoting home ownership played a role in the growing demand for housing, but the downfall of risk management was also a powerful force. Due to the explosion of the originate-to-distribute business model (fueled by the growth of securitization), underwriters of suspect home loans were freed from significant responsibility for whether the loans could ever conceivably be repaid. They passed the questionable loans onto highly leveraged investors and then focused on their core competency, making more loans. As the demand for these mortgage-backed securities skyrocketed, underwriters tapped pools of more and more suspect borrowers.

So the people making the loans lacked the proper incentives to monitor their quality, but why didn't investors impose market discipline on the lenders to make better loans? For some investors, the simple answer seems to be they didn't realize how risky these assets were. No risk management systems were in place, and they instead relied on the rating agencies' seal of approval. However, many sophisticated investors did utilize complex financial models to measure their risk, and were no more successful insulating themselves from loss. It wasn't that these models were incorrect, per se, but they did provide an unrealistic picture of risk. It's true these financial securities are opaque, but with correct assumptions of home price declines and the severe constriction of credit that ensued, the models do provide a mathematically correct description of the crisis. The models went astray largely because the likelihood of these market conditions was not given due weight. Undoubtedly, there was widespread error in judgment, but before deriding the modelers too harshly, let's try to understand the difficulty of modeling rare events. Home prices have not fallen this sharply since the Great Depression. Given that the financial landscape is so radically different

<sup>1</sup> William McChesney Martin, chairman of the Federal Reserve Board (1951–70), describing the role of the central bank.

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today, and we understand much more about how the economy functions, how much weight should models place on 75-year-old events? There is no definite answer, and modelers will continue to struggle with this question, but a clue can be taken from emerging behavioral economic research that indicates people tend to systematically underestimate the likelihood of rare events. No doubt this has contributed to the running financial joke that a once-in-a-century event occurs every few years.

Still, this is not only a story of a lack of information, or faulty assumptions. Though in the minority, a number of risk managers and economists warned of the impending troubles several years ago. Why were they largely ignored? Many would answer, "greed and arrogance," without hesitation. Those traits certainly played a role, but I believe there is another, underappreciated cause. The psychology of a bubble is very difficult to defeat. Standing up for the contrarian view requires extreme fortitude in a world of cheap credit and seemingly riskless return. Whether the collapse in home prices was inevitable, merely likely or rather a realization of a rare event is open for debate. However, the famous quip by the legendary economist John Maynard Keynes tempers its significance, "The market can stay irrational longer than you can stay solvent." Imagine the unenviable positions of bankers, investors and mortgage lenders who suspect the tenuous nature of their situation, but face immediate pressure to compete with so many who are engaging in the risky behavior. Some executives likely faced the option of a) holding their ground and risking removal immediately (by either their boss or shareholders), or b) going along with the trend of leveraging investments as much as possible, and hoping their fears were not realized. In these situations, it can be rational to abandon your principles and take the risks. The decision to heed the warnings of the risk managers, however believable, is much more difficult (and risky in the short term) than expanding with the bubble as it inflates. In addition, even the brightest minds can begin to question their own

beliefs when the actions of others indicate a completely different view.

#### Improving Risk Management

While there's no panacea for risk management, I believe there are steps we can take. One of the likely benefits of this crisis will be greater appreciation for risk management, both by managers and investors. Many CEOs have taken the fall for their firms' poor performances. While executives have an interest in avoiding large losses in the future, ultimately they are agents of investors, and incentive for risk management should come from this diffuse group. More thoughtfully designed, shareholder-approved pay packages that incorporate risk-adjusted performance measures (likely measured over time) can send important messages to firm managers about the risk level with which they are comfortable.

The libertarian idea that rational self interest will regulate financial markets made mainstream by former Federal Reserve Chairman Alan Greenspan is compelling, but even he now admits a fatal flaw. Many regulations are aimed at preventing the powerful from taking advantage of the weak, but the real problems with the credit crisis were caused by people systematically acting in opposition to their long-term self interest. Predatory lenders did take advantage of naive borrowers, but by and large these lending businesses no longer exist. Borrowers did lie about their incomes, but were the years spent living in nicer homes than they could afford worth the pain of foreclosure? The question of why such large scale departures from rationality occasionally occur is fascinating, and far too complex to address here. Suffice it to say the purest form of Homo Economist is a myth, and while we should respect the right of people to make some foolish decisions, regulations are necessary to limit this type of systematic failure. Paramount to their effectiveness is the structure of regulations. Tighter restrictions on making loans may have prevented this crisis, but will those rules prevent future crises? More likely

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than not, future crises will look different, exploit other regulatory loopholes or result from new products that aren't sufficiently covered under current regulations. Designing an effective system is a difficult task, but a principle-based approach to regulation focusing on the enterprise-wide risk position of a firm, and the role the firm plays within the economy, could help limit systemic problems in the future. These ideas are emerging in talks of regulatory reform in Europe and the United States, and are an increasing focus of rating agencies.

While more risk management is needed, ignoring its inherent limitations is, in itself, a risk. Mathematical models are quite useful, but consider the scale of determining the worst loss that might occur in one year out of 1,000,

as is often the goal. A lot has changed since the Battle of Hastings in 1066 (even more than since the Great Depression). Relevant historical data to model losses with such precision is generally unavailable. Models can and will get better, but mathematical sleight-of-hand can only go so far in overcoming a lack of data. With the likelihood of extremely rare events always in question, and knowing our inherent biases in assessing them, we may find it beneficial to downplay the role of tail probability in our analysis, and instead ask questions such as: Are we comfortable with the knowledge that such scenarios might occur? How can we mitigate the risk? How should we react if those situations begin to play out? Again, improving risk management will be difficult, but we will get better.

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# Prudent Enterprise Risk Management Strategies: Managing Liquidity

Modeling and Managing Liquidity Risk

BY GARY G. VENTER

## Modeling and Managing Liquidity Risk

by Gary G. Venter

Much of the current crisis can be traced to models that failed to adequately reflect risk, both in housing costs and complex financial instruments. Even if historical home-price data had never recorded changes like those realized recently, data from other bubbles, from tulip bulbs on, could have been used. It was not clear that housing was in a bubble, but bubble scenarios should have been in the models. Those model issues need to be, and are being, addressed, but here the focus is on liquidity risk.

Regardless of the underlying causes, liquidity problems can be magnified by market price disruptions, and these effects should be included in risk models. Such modeling needs to postulate a mechanism. Morris and Shin (2004) model “liquidity black holes” as arising from price movements and common trading strategies of short-term investors:

“liquidity black holes have the feature that they seem to gather momentum from the endogenous responses of the market participants themselves. Rather like a tropical storm, they appear to gather more energy as they develop. Part of the explanation for the endogenous feedback mechanism lies in the idea that the incentives facing traders undergo changes when prices change. Market distress can feed on itself. When asset prices fall, some traders may get close to their loss limits and are induced to sell. But this selling pressure sets off further downward pressure on asset prices, which induces a further round of selling, and so on. Portfolio insurance based on dynamic hedging rules is perhaps the best known example of such feedback.”

Certainly market disruptions predated the widespread use of dynamic hedging, but not recognizing such mechanisms can overstate the protection these strategies provide, and result in more reliance on them and an understatement of the risk of increasing leverage. Dynamic hedging strategies need to be updated to include the possibility that the called-for trades cannot be completed as prescribed.

Typical ERM modeling emphasizes the risks to asset and liability values, but the current crisis has made it clear that liquidity risk has the potential to sharply undermine a company’s financial position over and above price risks. Future ERM modeling will have to address liquidity risk as well as the existing price and value risks.

Basic liquidity risk is the chance of not having the funds available to pay liabilities due. But being forced to post collateral could be another type of liquidity risk, even if that collateral is technically an asset. More broadly speaking, realizing losses because of forced sale of immature assets, and even loss of investment opportunities due to cash constraints, could be included under the rubric of liquidity risk. With a severe market disruption, liquidity problems can be exacerbated when normally liquid assets become illiquid. These possibilities can all be reflected in model scenarios.

Liquidity management has features in common with capital management. Maintaining a stock of *liquid* assets can provide a liquidity cushion. Also matching cash flows of assets and liabilities, or at least some portion of them, can help manage liquidity risk. Contingency funding plans are a useful part of liquidity risk management as well, where less liquid assets are to be used as loan collateral. However this strategy may fail to work under a market disruption unless lines of credit are secured in advance, as even collateralized loans may become unavailable. Specifying the liquidity of various assets and liabilities in the model formulation and evolving them over time can incorporate liquidity into risk scenarios. For instance, Das and Hanouna (2009) discuss a few measures of liquidity.

Property-liability insurers use reinsurance as a cost-efficient substitute for capital, but in a disruptive event, reinsurance prices and availability can change sharply. Management of this risk could include having contingent capital sources in place, as well as including reinsurance terms that can expand coverage, such as additional rein-

### Modeling and Managing Liquidity Risk by Gary G. Venter

statements. Again dynamic modeling should include the possibility of such liquidity issues arising.

Modeling liquidity risk can start with stress tests. The current market is one example of a stress scenario. A convergence of adverse asset, liability and credit availability situations can be postulated and the cash flows projected along with the value changes. Probabilistic scenario generation requires assigning probabilities to the stress scenarios and including them in a larger simulation. Having a model that predicts occasional market dislocations, such as Morris and Shin's, can help incorporate liquidity events in the scenarios. Certainly there is an interaction between price movements and liquidity movements that can be taken into account.

Such modeling can quantify the impact of liquidity risk on capital adequacy. Part of the problem is recognizing off-balance-sheet cash needs that can arise in a market disruption, such as collateral requirements, embedded options, refunds due to ratings down-grades, etc. This also emphasizes the utility of dynamic ERM models—models that include response strategies to various events. Dynamic ERM models can also benefit from the frame-

work of timeline simulation, where events are simulated in order of occurrence and time stamped (see Kreps, 2009). What is now important in models is to have scenarios and responses take into account the possibility that other players are following the same strategies; liquid assets may become illiquid; off-balance-sheet commitments might be triggered, etc. Models for these possibilities and the interaction of price and liquidity are appearing in published theory, but nailing down reasonable probabilities for liquidity and corresponding pricing events could be an area of research for some time to come.

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## Societal Themes: Limited Liability Laws

An Ideal Crisis  
BY SHANE WHELAN

## An Ideal Crisis

by Shane Whelan

Risk modelling is a risky business, but the burden of risk model failure is often borne by society in general rather than the firm in particular. This division of the ultimate cost ensures that risk models systemically underestimate the risk, as they are designed to capture only that part of the risk borne by the firm. In short, the risk models that underestimate risk will drive out the more reliable risk models that entail a lower return on their increased capital.

The underlying dynamic is simple. Consider Firm X that puts all its capital, made up of 50 percent equity and 50 percent of borrowings, into a venture that has, say, a 50 percent chance of doubling the investment and a 50 percent chance of losing it all. The expected payoff of the investment is the sum of the probability of each outcome times its payoff. In this example the expected payoff is simply the return of the original investment (that is, 0.5 times twice the capital plus 0.5 times nil). However, that is not the expected outcome for the firm's equity holders: their expected payoff is one and a half times their original investment, (calculated as 0.5 times [four-times the equity holder's original investment less loan of once their investment] plus 0.5 times nil). The equity holders are clearly incentivized to invest in the venture as it amply rewards their portion of the risk, even though it is not rewarding the overall risk run.

The stylized example above is oversimplified in just one material aspect: the risk could be quantified precisely. In practice, payoffs of ventures in the real world cannot be determined, as Keynes famously remarked, by "strict mathematical expectation." This observation means that the odds must be regarded as guesses—at best educated guesses. And it is the firm, and its risk models, that are regarded as providing the most educated guesses as it is in their chosen specialty. Incentives to bias risk measurement for those most expert in measuring it can be expected to lead to recurring disasters as risk periodically leaks out from firms to be mopped up by the rest of society.

The simple model applies to the property developer,

mainly funding his activities from bank loans; to the buy-to-let investor or owner-occupier almost entirely funded by banks; and, to the banks themselves whose liability is limited to their capital base. And so we have the systemic underpricing of risk in the property market bursting the banks that were meant to hold it back in the fall of 2008.

Ever since debtor prisons were abolished in favor of lenient bankruptcy laws and limited liability allowed to firms, society created the incentive to misprice risk and therefore the inevitability of such episodes. According to this explanation, the world can point its finger at the United States who, first amongst nations in modern times, allowed unrestricted limited liability to firms from 1811 (beginning in New York state) and, from 1833, began repealing harsh treatment of defaulting debtors. Even today the United States remains to the fore with some of the most lenient bankruptcy laws in the world. This analysis is, however, only part of the explanation for the current system failure, and the proposal to repeal the laws is perhaps not the least costly solution: such laws arguably enabled the emergence of modern innovative economies.

Modern economies are based on the premise that all the main players look after themselves. The bankruptcy and limited liability laws gave property speculators and banks a put option on society so they could walk away from losses above their capital base, yet enjoy all the gains of such speculation. They acted in what they believed were their own interests. It seems that society—well aware of what was happening—did not effectively look after its own interest and now must pay the price.

Society, of course, appoints a financial regulator to look after its interests in this regard. The aim of regulation is designed to keep the probability of insolvency sufficiently low so that the direct and indirect damage caused by insolvency is set equal to the broad social ills of an inefficient overcapitalization of the industry. The expected payoff to the shareholder, when the financial regulator understates

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the real probability of default, is increased at the expense of society as our example showed; as the shareholder maintains greater exposure than is reasonable with the risk capital employed. The regulator must ensure the shareholders factor into their decision-making the risks that will ultimately be borne by society (so regulation is designed to “internalize the externalities”). This requires a reasonably accurate model of the behavior of the extreme left tail of outcome distributions and ensures, in the current case, that banks are suitably capitalized.

The current dominant methodology for banks assessing their capital needs (or, indeed, hedge funds) is based on estimating the value-at-risk (VaR)—that is, the capital that is needed so that the probability of needing more is sufficiently low (say, 1-in-100 or 1-in-1,000 chance). For speculative assets, one typically fits a distribution to possible returns and works out the implied VaR from this. It is well-known that the Normal distribution tends to underestimate the probability of extreme movements (the failure of the hedge fund, Long Term Capital Management, was a dramatic reminder of this; see Jorion (2000)). A more common approach of late is to fit a Student t-distribution to historic returns with the degrees of freedom selected so that the kurtosis of the Student t-distribution matches that of the sample kurtosis (see, for example, Jorion (2002)). This typically produces a higher VaR, but still appears to understate the true risks run. Berkowitz & O’Brien (2002) studied how risk models employed by six large multinational banks performed in practice. They reported that losses can substantially exceed the VaR and raised the concern that such occurrences may be correlated across the banks—indicating the possibility of a systemic risk across the banking sector when it comes to such extreme falls.

There were, of course, many more warnings that banks and other financial companies were significantly understating the risks in their portfolios. A growing literature was showing that the kurtosis of the return distribution of speculative

assets does not exist (that is, the sample kurtosis will tend to infinity as the sample size increases) and that therefore; the VaR, and the extent of the expected loss once the VaR was exceeded, was considerably higher than was previously believed (see Whelan (2003), Chapter 4, for an overview of the literature). The closer we look, the bigger the investment risk appears. Simultaneously, there were some tell-tale signs that the financial services industry was coming to appreciate the magnitude of the risks and had busied itself over the last couple of decades in passing on investment risk to where it is least appreciated. Within the sphere of an actuary’s influence, investment guarantees on pension and life products were withdrawn or reduced, defined benefit schemes were wound up, risk was transferred to members via defined contribution arrangements, and even reinsurers began setting limits to their ultimate exposure (the development of so-called “finite” reinsurance).

So, according to the assessment above, one might conclude that actuaries should get higher marks than bankers for their arithmetic. Yes, but society is not primarily concerned with who gets their sums right. Keynes knew, and the limited liability and bankruptcy laws enshrine the view, that getting the sums wrong is often better:

“it is probable that the actual average results of investments...have disappointed the hopes that prompted them... If human nature felt no temptation to take a chance, no satisfaction (profit apart) in constructing a railway, a mine, or a farm, there might not be much investment merely as a result of cold calculation.”

The world banking crisis allows us to point the finger at the bank regulators who got it wrong by failing to enforce capital requirements commensurable with the risks run. No disapprobation applies to the pension and life assurance regulators who allowed actuaries get their sums right and quietly pass on the risks to individual savers. But which leads to the greater cost to society? To solve the banking

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crisis, each economy must now redistribute the losses to those that can bear them by some mechanism or other. However, it is difficult to envisage a solution to the greater misallocation of risk in society—there is unlikely to be an acknowledged crisis and certainly no bail-out of all of those individual pensioners who learn too late the true cost of investment risk.

The economic system that has developed over the last couple of centuries comes with embedded periodic crises due to its inevitable mispricing of risk. That is our system, and it is the best yet devised. What we can do is choose the type of crisis we get. The current loud global banking crisis, insisting on the simple if unpleasant measures, is altogether more preferable than the future silent problem of individual pensioners, isolated and ignored in their increasing poverty.

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Societal Themes:  
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## Transparency and Liability Valuation

by Philip E. Heckman

The most notable thing about the current crisis in the financial markets is the nature of the instruments that caused the trouble. The subprime mortgage debacle would have been bad enough by itself, but it has been aggravated out of all proportion by marketing of mortgage obligations as CDOs, sliced and diced in backroom chop shops, blessed by the laying on of hands by the rating agencies and sold over the counter to the unsuspecting. In fact the regulation of these instruments was strictly hands-off. Similar things can be said of the rogue portfolio of credit default swaps that brought about the near-collapse of AIG. The common thread here is that all these factors conspire to confound scrutiny and to frustrate attempts to trace obligations back to the originators, in a word, to undermine *transparency*.

Supposedly the regulatory vacuum surrounding these instruments, imposed by law in the case of CDSs, was intended to permit the “free” market to work its magic without interference. Here we are led to draw a distinction between “wild” markets and “free” markets. A wild market is unregulated and unscrutinized. Information flows are purposely impeded for competitive reasons and reduced to trickles from rumor and espionage. No one knows what anyone else is doing, and pricing is blind and haphazard. In such a market, there are no safeguards against anticompetitive behavior and no guarantees that the market will clear. The only guarantee is that there *will* be liquidity crises.

When economists claim almost mystical advantages for “free” markets, are they talking about the wild markets described above? Hardly. All the *empirical* evidence for the virtues of free markets, market efficiency foremost, comes from exchanges. Only exchanges produce the quantitative data needed to support such conclusions. Only markets where transactions and valuations are disclosed timely and accurately can enjoy the advantages claimed for the free market. *There is no efficiency without transparency*.

So what does all this have to do with accounting standards for liability valuation? Although many think of them only as a source of operating costs, financial accounting

standards are intended as a means of conveying timely, accurate and relevant information to the investment markets. The fair value initiative was put forward by FASB and IASB in order to advance this goal. Does it have a prospect of succeeding? The current outcry against fair value market-to-market accounting in the banking community concerns mainly the valuing of assets with impaired liquidity, for which market values are unknown or erratic. (As an aside, before we talk about liabilities, I suggest that this outcry, arising from the subprime crisis, would have been nipped in the bud and confined to a narrow sector if only CDOs were traded on exchanges.) Apart from problems with asset volatility, liabilities add a whole new layer of confusion to the fair value puzzle, which so far has attracted little notice.

The central concept of fair value is to record values for assets and liabilities which are as close as possible to the values these instruments would have in an open market, supposing one existed. IASB and FASB (abetted by some in the financial economic community) recognize no difference in the valuation bases for assets and liabilities: liabilities are recorded at the current market price payable by the beneficiary of the contract. This has perverse consequences. For instance, a company can reap profits from a credit downgrade, which leaves it free to write down its liabilities because it is now less likely that it will be able to honor them. A dramatic instance is provided by Radian Group in first quarter 2008, where a \$215 million loss was turned into a \$195 million profit. (David Reilly, *The Wall Street Journal*, May 19, 2008, p. C12.) Radian made full disclosure of this oddity, but it was under no legal or regulatory obligation to do so. Other companies enjoying similar windfalls might be less forthcoming.

This opacity in the accounting for liabilities did not begin with fair value but is as old as the discipline of accounting itself. In accounting for debt, it has always been the custom to record the proceeds of the loan as the initial liability and to amortize on a fixed schedule using the implied interest rate. The change introduced by fair value is to take

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account of changes in market interest rates by revaluing the liability and running the changes through income. This is precisely what produced the Radian anomaly and drew attention to the defects of the entire scheme of accounting for liabilities.

In point of fact, the accounting discipline has produced an alternative. Professors Chasteen and Ransom of Oklahoma State University propose a revolutionary schema (*Accounting Horizons*, July 2007) for rationalizing the accounting for liabilities. Their approach rests on the realization that the insolvency put (the value of the corporate owners' immunity from recourse in the event of default), is a benefit directly to the owners and not to the enterprise itself. In the case of obligations certain as to amount and timing, they propose recording the liability at the appropriate risk-free rate. The difference between this value and the actual proceeds (the share of the insolvency put pertaining to the liability) would then be recorded as a direct charge against equity. Future changes in valuation due to changes in the risk-free rate would be taken through income, while the effect of changes in credit standing would be charged directly against equity. This approach would lead to a balance sheet transparent as to the enterprise's actual financial obligations and would provide directly useful information to the capital markets. Further, it would conform to the going concern assumption of financial accounting, since it assumes that the enterprise will, in fact, honor its obligations.

Does the going concern assumption cut both ways? There has been considerable anguish over the fair value requirement to record assets at current market value

regardless of whether the market is functioning properly or not. It seems that an enterprise accounted for as a going concern should be able to record assets with reasonably well known future cash flows discounted at rates which exclude illiquidity penalties. I do not know of a widely accepted analytical approach for filtering out the effects of illiquidity on market prices. If one exists, now is the time to dust it off; else, now is the time to invent one.

As I noted above, the financial accounting system is intended to enhance transparency in the financial markets. The fair value reform was intended to further this goal. In its present state, it does not. "Mark to market" assumes that, if liabilities were traded, assets and liabilities would trade in the same market. They would not. Liabilities would trade in a market where the price is determined by adding the cost of surety (the insolvency put again) to the asset price. The current formulation of fair value is too simplistic by half, and the result is not transparency but opacity. It will not serve its purpose until accounting for liabilities is rationalized and means are provided for dealing with market pathologies.

When someone extols the virtues of "free markets," listen carefully to discern whether he is advocating disciplined, efficient, transparent and orderly markets or whether he is making a sly appeal for laissez-faire where opacity rules, anything goes, ample scope is provided for deeds done in darkness, and epic train wrecks are inevitable. We should heed the lesson of *Blazing Saddles*: when there's no marshal in town, the bad guys take over.

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## Creating an Exchange for Insurance Contracts

by Oakley E. (Lee) Van Slyke

### Observations

As risk professionals, we know that managing leverage is the heart of risk management. Leveraged businesses naturally tend to use excessive leverage. We deal with regulations that exist in order to dampen the tendency among insurance companies to become overextended during the underwriting “soft market.” We observed that hedge funds, investment banks and private equity funds used excessive leverage as the credit boom went on. We observed an attitude of *laissez faire* rather than a call for regulation.

As risk professionals, we know the importance of personal underwriting. During the credit boom, lenders did little or no personal underwriting. Lenders relied on credit ratings, especially on ratings of the packages of loans they were laying off to investors. The rating agencies in turn used technical measures of risk rather than evaluating each package of loans individually.

As risk professionals, we know the importance of managing leverage. Investment models that relied on ratings assumed that those ratings were bets on independent events. Actually, all the risk events were linked together. The ratings shared the same defects and were subject to a single point of failure. Investors and rating agencies failed to recognize the increasing risk of increasing leverage. In short, ratings failed to assess risk.

As risk professionals, we know that outcomes don't fit simple models. Indeed, our training suggests that all models are wrong, although some are useful. We appreciate the importance of using a variety of valuation approaches and selecting an estimate that makes sense in light of all of the results. When values must be set using algorithms, we encourage algorithms that blend the estimates of several models. We respect the importance of testing those models and calibrating them with actual data derived from many years' experience. We observed in the current crisis the banks placed excessive reliance on a single simple model, often called value at risk (VAR).

As risk professionals, we know that wise insurance regulation has often led to the merger of a poorly managed book of business into a well-managed company. Bankruptcy is seldom the best option. As risk professionals, we know also that regulations have a cost in terms of productivity and service. Most of this cost is borne by customers because it can't be passed on to shareholders. Customers also get most of the benefits of regulation, including solvency protection and better service. The best regulation provides enforceable contracts, criminalizes fraud and minimizes bad information.

Insurance contracts are living documents. Many are endorsed, renegotiated, cancelled mid-term or subject to audit. In the credit boom, on the other hand, despite the likelihood that at least thousands of subprime mortgages would default, lenders did not designate people or agencies to renegotiate the terms of loans. Foreclosure was the presumed outcome, and it became the only outcome even when foreclosure was not in the financial interest of the lenders.

No government commands all of the resources of the capital markets. Some governments such as Iceland and Switzerland have quite limited resources as lenders of last resort or investors in banks. As risk professionals, we appreciate the importance of engaging the world's capital markets, the more directly the better. The best solution is one that can be adopted globally.

As Steven Cecchetti, now the chief economist of the Bank for International Settlements, has pointed out, “The difference between futures and swaps is that futures are standardized and exchange-traded through a clearing house. This distinction explains why Amaranth's failure provoked a yawn, while LTCM's triggered a crisis. It suggests that regulators, finance ministries and central bankers should be pushing as many securities on to clearing house-based exchanges as possible. This should be the standard structure in financial markets.”

As James Surowiecki, author of “The Wisdom of Crowds,” has pointed out, the presence of a well-respected

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company on an exchange does not mean that that exchange is for every company. Companies that raise capital for non-financial activities by selling bonds and issuing stock are suitable candidates for listing on stock exchanges. However, companies that rely on or issue financial guarantees (such as investment banks and financial guarantors) take on additional risk when they issue stock because a general loss of investor confidence will reduce the fair market value of their assets at the same time that it reduces the willingness of investors to hold their stock.

That is, we are cautioned to use exchanges and to choose them wisely. At present there are only two kinds of exchanges in practice: securities exchanges and commodity futures contracts exchanges. Securities markets cope with rapid price changes, but are characterized by long-term price bubbles followed by bankruptcies. Commodities exchanges handle both asset positions and liability positions, but seize up when prices change quickly; many kinds of contracts which can be expected to have rapid price changes can't be placed on commodities exchanges.

The invisible hand of the market works in theory only when there is an active exchange between willing buyers and willing sellers. When there are willing buyers and willing sellers for goods and services, the invisible hand seems to work well in practice, too. The problem is not with the theory of the active market. The problem is that from time to time there are reasons that buyers buy against their will or sellers sell against their will, or that buyers are restrained from buying or sellers are restrained from selling.

The more the investors believe any one theory or explanation, the more they tend to move as a herd. In the recent bubble, accounting rules and the pressures on CFOs added particularly to the herd-like behavior. This always happens a bit. But in this case the change to "fair market value" accounting caught many CFOs without the training, experience or data processing capabilities to make intelligent estimates of fair market value. The default valuation

has been "the last transaction," which has caused all CFOs to use the same estimate no matter how unwilling the buyer or seller. Accounting rules also had the effect of keeping a homogeneous class of contracts "off balance sheet" until, in the span of just a few months, the contracts became illiquid, at which point other accounting rules brought those contracts onto balance sheets.

Investors can move as a herd toward ever-higher asset prices even when a few investors attempt to turn against the herd. When a contrarian loses a bet, his loss both increases the wealth of the herd and justifies the herd's direction. As Keynes said to contrarians, the market can stay wrong longer than you can stay solvent.

#### Lessons Learned

Neither securities exchanges nor commodity futures exchanges were designed to deal with securitized derivative contracts. Securitization can be a good way to access the global capital markets, but only if the problems we've observed are successfully addressed.

These problems are:

1. Securitization must no longer be an impediment to the normal process of renegotiating contracts. Packages of contracts can be listed on a contracts exchange, but this should not preclude negotiations of changes in the underlying contracts.
2. There must be an abundant flow of transactions between willing buyers and willing sellers. Securitizations must be standardized and traded on exchanges. Every position should be carried on a balance sheet. Transparency is important, but "fair market value" does not help if there is no market that has willing buyers and willing sellers.
3. Prices on securities exchanges can change quickly without seizing up but can't go close to zero without inviting bankruptcy. Prices on commodities futures contracts exchanges can be "long" or "short" but can't

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change quickly. Both of these problems must be addressed at the same time.

Policy Implications

The system of using securities exchanges and commodity futures contract exchanges is inadequate to the task. Neither can transfer the risks of derivative financial contracts to the capital markets. Regardless of the degree of regulation or the financial incentives, this system is insufficient. A new type of exchange is needed that copes with fast price changes—even from “long” to “short”—without inviting bankruptcy.

A new type of exchange is needed. This new type of exchange would enable its traders to trade shares of standardized packages of financial contracts without

margin accounts, position limits or daily price change limits. Those traders must be listed on a securities exchange so that the world’s capital markets are able to invest in them. Regulations would be needed to prevent fraud and price manipulation, but not to prevent any trader’s insolvency, as ease of entrance and exit must be built into the system.

Providers of insurance, financial guarantees and product warranties as well as derivative contracts of all kinds should be either highly regulated or listed on contracts exchanges that ensure transparency and liquidity, permit ease of entry and exit and collectively have the backing of the world’s capital markets. Retail insurance companies are highly regulated. Reinsurance companies and syndicates could be listed on liquid contracts exchanges or be highly regulated.

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## The Game of 'Pass the Risk': Then and Now

by Joy A. Schwartzman

*Financial crises are nothing new. What is unique and sobering is the far greater speed with which the current situation has evolved from a weakening of the U.S. housing market into a full-blown, global economic meltdown. Also new this time is how quickly the fallout spread beyond the financial sector into all areas of the economy. Advanced communications and information technologies are creating an era of greater risk with more serious and far-reaching consequences when compared with even the recent past. The increased speed, complexity and interconnectedness of global markets today make them more vulnerable to correlated risks that can combine to magnify liability. These new time and impact factors must be included in any future risk analyses.*

The desire to succeed and do well financially encourages most people to work harder—to be more creative, innovative and productive. But at what point does enlightened self-interest mutate into greed and reckless disregard? When does innovation cease to be about creating a competitive edge and start to become a tool for gaming the system?

Consider some past economic crises: The London Market Excess (LMX) spiral<sup>1</sup> that began to unwind in the late 1980s; the 1990s U.S. savings and loan scandal; or the more recent bursting of the Internet and housing bubbles. These financial debacles all began life as positive examples of innovation. Each was touted originally as a new and profitable way of conducting business. Each promised to bring benefits to all, but culminated instead in bringing economic ruin to many.

Are unwinding spirals and busting financial bubbles the price that must be paid for harnessing self-interest in pursuit of innovation and profit? Is it possible to create risk management or other safeguards that can successfully re-

ward innovation and enlightened self-interest, and yet restrain it from boiling over into rampant greed?

These questions become more urgent in the wake of the current financial crisis for two reasons:

1. **The greater speed at which financial data travel around the world today.** New communications technologies have turned the investment world into a large and loud economic echo chamber—one that feeds on and multiplies its own exuberance or panic. The instantaneous transmission of both good and bad economic news creates a climate of hair-trigger reactions as traders in different markets buy or sell on the rumor of the day. These knee-jerk transactions are then turned immediately into new data that exponentially amplify the fallout from the initial event. In this way economic ripples quickly become market-swamping tidal waves.
2. **All markets, industries and economies are now truly connected.** The consequences of economic events are no longer confined to one region, industry or nation. The fallout from the LMX spiral was largely restricted to the U.K. reinsurance market. The savings and loan scandal stayed in the United States and was contained within the banking industry. The bursting of the Internet bubble was global in scope, but its effects were not felt much beyond those who either worked for or held stock in Internet start-ups. The current crisis, however, which began simply as a softening of the U.S. housing market, grew within an incredibly short span of time into a global financial meltdown that has brought down major banks and affected almost every industry in every country around the world.

In pursuit of understanding how this happened and

<sup>1</sup> The "LMX spiral" represents excess of loss reinsurance placed in the Lloyd's and London Market in the 1980s where reinsurers participated in different layers of the same exposures, often unknowingly. As claims were reported and reinsurance recoveries were triggered, losses worked their way through the "spiral," often passing back and forth through the same group of companies.

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how the environment for risk has changed in only a few decades, it is helpful to look at some of the similarities—and, more importantly, the differences—between the conditions that preceded and led to the aforementioned LMX spiral, and the collapse of the subprime residential-mortgage-backed-securities (RMBS) market that sparked the current financial crisis.

Collateralized debt obligations (CDOs) and other debt securitization products were touted as way of diluting the poison of toxic risk by mixing it in with good, investment-grade debt. But instead of the good credit risk making the bad credit risk harmless, the bad risk polluted and ultimately froze the entire credit market. The excess of loss (XL) contracts of the 1980s placed in the Lloyd's/London Market were seen initially as a way of spreading risk across a series of reinsurers with the financial capacity to carry it. Both strategies became instead vehicles for foisting severely underpriced, highly correlated risks onto others—transmitting and multiplying toxic risk, in the case of the subprime mortgage debacle, so that it proceeded to spread like an infecting virus throughout the entire financial system—or, in the case of the LMX spiral, spreading risk at price levels that ultimately became toxic to some reinsurers when losses materialized.

The LMX spiral developed in the 1980s, during a time of relative softness and quiet in the reinsurance market—there had been low frequency of major catastrophes since the 1960s, and it appeared that markets and home prices would only ever go in one direction—up. (Sound familiar?) To compensate for falling rates in a soft market, Lloyd's greatly expanded its use of London market excess of loss (LMX) policies. LMX policies reinsure the policies of another reinsurance company or syndicate in exchange for a share of the premium. LMX business was attractive because it was easy to administer, had low overhead, and the aggregating exposures could be off-loaded to other

reinsurers. Adding to their popularity and quick growth, LMX deals also offered commissions to brokers as high as 10 percent, thereby making them an attractive sell for brokers (very much like subprime mortgages). With risk ostensibly low and commissions high, it seemed a bit like free money, just as low interest rates and ever-higher home prices appeared to be a license to make money during the recent housing boom.

The growing popularity of LMX deals coincided during the '80s with a period of expansion within Lloyd's, as it opened its doors for the first time in centuries to thousands more "Names" (individual investors), many of whom were unsophisticated when it came to the insurance industry. These newer Names were disproportionately shunted into syndicates with a heavy concentration of LMX policies.<sup>2</sup>

Problems developed when a series of huge losses incited an escalating spiral of claims that pinged back and forth among the finite number of companies and syndicates that had spent the past few years writing excess of loss protection for each other. There were huge losses related to the Piper Alpha oil platform explosion in the North Sea, the Exxon Valdez oil spill in Alaska, Hurricane Hugo, the San Francisco earthquake and a devastating windstorm in Europe. Any one of these events may have been enough to start the spiral unraveling; taken together they precipitated the greatest financial crisis in Lloyd's 300-year history. Lloyd's lost nearly 8 billion pounds between 1988 and 1992, many of the losses due to negligent underwriting, according to British courts.

The similarities between the LMX spiral and subprime RMBS debacles are many. In each case there was:

- An attempt to mitigate risk by spreading it to market participants
- A series of new and complicated financial instruments not understood by most people and not even well

<sup>2</sup> Along with asbestos exposures.

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understood by market professionals

- A pool of unsophisticated investors not adequately advised of the risk they were taking on
- A collection of unscrupulous brokers (reinsurance/mortgage) who took advantage of the situation to increase commissions by encouraging as many deals as possible with no concern as to how they might play out in the future
- Huge profits that continued as long as nothing happened to change the situation on the ground.

In the case of the LMX spiral, there were no issues as long as there were no catastrophic events to set off a series of back-and-forth claims among the finite number of reinsurers. In the over-heated RMBS market, everything was fine as long as housing prices continued to only go up.

The differences between the two crises sparked by the LMX spiral and the subprime meltdown are fewer and have more to do with how the two situations played out once the trouble began. They are also more important than the similarities for purposes of “lessons learned.”

- The LMX spiral continues to play out, but has not spread to other areas of the financial system. There was time to digest what was happening and to respond in a manner that left the institution of Lloyd's and the London insurance market intact and at least functioning in its weakened state, despite the seriousness of the crisis and the depth of the damage caused by it.
- Lloyd's ultimately made good on its obligations and—with the creation of Equitas, a facility created to off-load the unprofitable business years—returned to profitability. This cannot be said for Lehman Brothers, Bear Stearns or the many other banks, mortgage companies and unrelated businesses that have either failed, been sold or are teetering on the edge of insolvency in the wake of the subprime securitization meltdown.

Time is no longer on the side of today's financial institutions in a state of crisis. And markets are so globally interrelated today that the fallout from major financial problems can no longer be contained to one country or region of the world.

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## From Liquidity Crisis to Correlation Crisis, and the Need for 'Quanls' in ERM

by Stéphane Loisel

*The liquidity crisis and the insufficient depth of the market led to a strong correlation crisis: many risks that could be considered as close to mutually independent in the classical regime suddenly became strongly positively dependent. More correlation crises may happen in the future. We need to be more careful with black-box tools and to train what I would define as "quantitative analysts" ('Quanls') in the Enterprise Risk Management (ERM) process, that is risk managers who are able to lead interdisciplinary ERM studies from a jointly qualitative and quantitative point of view, with an emphasis on dynamics.*

The recent crisis may be regarded as a result of the lack of the depth of the financial market to absorb liquidity needs after a period of artificial additional growth generated by (too) easy access to credit and (too) low interest rates. As things went wrong, many risks, often considered to be close to independent, suddenly became strongly positively dependent: this is what we define as a correlation crisis in Fisher et al. (2008) and Biard et al. (2008).

From the point of view of the insurance industry or of the equity derivatives market, the recent crisis would be a consequence of an external shock arising from the sub-prime crisis in credit risk. The fact that many companies defaulted or were downgraded almost simultaneously corresponds to what is often referred as a consequence of the smile of correlation: correlation has been known to be larger in bad times than in the classical regime for quite a number of years.

Nevertheless, after this exogenous risk appeared, once liquidity needs are there and as the market is not deep enough to absorb it, most market participants tend to behave similarly, breeding a vicious cycle: because of margin calls and liquidity needs, investors are forced to sell valuable (on the long term) assets at the bad instant, which leads to adverse price moves, further margin calls, and so on... This copycat behavior generates and amplifies risk

within the market and as such is an example of endogenous risk, in analogy with the horizontal oscillations of the Millennium Bridge of London that forced the bridge to close for a battery of tests three days after its opening to the public, as noted by Danielsson and Shin (2002).

A pandemic could create a correlation crisis between insurance and financial risks. The consequences on the future earnings of insurers and the difficulties that financial institutions would have to maintain their activities are often underestimated in Solvency II and in Basel II. The way correlations are defined in QIS4 of Solvency II does not really take into account correlation crises that could occur after a catastrophe, or just because of endogenous risk, for example with surrender options. How to value these options, as well as deposits in finance, remains a question that has to be addressed in a more sophisticated way.

One often hears about the crisis that people got lost in the mathematics. I am convinced that some products were far too complex, and the models to describe their dynamics far too simple.

To me, considering more sophisticated models does not mean replacing a Brownian motion with a more general Lévy process, or a Gaussian copula with a mixture of Student copulas. I believe that we must pay more attention to the dynamics, and consider risk processes with non-stationary increments and dynamic correlation models, with the goal to understand the main sources of risk.

If a pandemic occurred, the delay between its beginning and the date at which insurers or reinsurers would have to pay, as well as the time elapsed before stock prices move back up after the epidemics, would be very important. Similarly, in the equity market, the correlation crisis that caused many basket options to be underpriced is likely to end later on almost as suddenly as it appeared, and missing this dynamic would lead to bad hedging strategies. Identifying the main sources of risk and understanding their

From Liquidity Crisis to Correlation Crisis, and the Need for 'Quants' in ERM by *Stéphane Loisel*

interactions is far more difficult, but it has to be done if we want to move to Basel III and Solvency II.1, instead of moving back to Basel and Solvency 0. Both fundamental and applied research is needed to tackle these issues. With an integrated risk view and a correct ERM process, those external shocks and their endogenous consequences could be studied and managed at the same time.

Important difficulties to overcome concern IT, Pillar 2 of Basel II and Solvency II and invisible barriers that make it quite difficult to implement an ERM process that guarantees this view of risk at the macro level. Very often, to meet the constraints of some softwares and to maintain robustness and auditability of processes, models are simplified, and key risks like credit risk or exchange rate risk may be ignored for some combinations of positions taken by the front office. Besides, some market participants, instead of using the official software, may take their decisions directly from self-developed programs that are black boxes at the risk management level. One must absolutely avoid blindly trusting black-box models as one trusted rating agencies to measure credit risk. In the insurance business, I am concerned by the fact that a few software developers have a monopoly on the quantification of financial consequences of natural disasters and are almost blindly trusted by many insurers and reinsurers, in spite of recent events and strange yearly price movements obtained for the same risk with the same software. Because these risks are complex and specific, it is tempting for supervisors to use this black box model as well. Similarly, in finance, some controls are made by the middle office with the front office software because it would be too expensive to develop another one. If market participants or insurers all use similar black box models, a hard correlation crisis might occur if an unmodelled catastrophe breaks out. To implement a valuable ERM process would require more transparency of models and strategies, and we get to one of the main issues to address after the crisis: how to deal with the mismatch between confidentiality and competition on one side, and the need

for an ERM process, for supervision and for communication to markets (Pillar III of Basel II and Solvency II).

Fair value and risk neutral valuation techniques have also been too often blindly used without exercising critical judgment. There is currently a debate on the use of fair value and the freedom to use a different framework during a crisis. First, I think one must not mix up accounting, regulatory and pricing tools. Second, a concept that should be useful to measure something and to take risk into account is not suitable if you can only use it when risk does not show up. Third, in contrast to some people who recommend forgetting these valuation techniques, I think they "just" need to be adapted to take into account risks of temporary illiquidity, correlation crises and copycat behavior and the way transactions are made, in particular if there are only a few market participants (in the case of insurance-linked securities, for example).

Another point to carefully address is the way brokers, traders, executives and others can maximize their salaries, and the perverse incentives this may create. The one-year horizon in Solvency II reinforces the preference for a short-term view too. It is clear that if no five- or 10-year indicator is added into the current project, most companies will mainly develop short-term capital models and not enough will consider long-term perspectives.

The same reasoning applies to governments: Was there an incentive for them to limit or to encourage easy access to credit? The answer is not the same with short-term and long-term views, but elections are a key factor to help them choose their strategy! This led them to underestimate the guarantees they would have to give to keep the financial system up. The guarantee that governments provide to some financial institutions should be studied in detail because of the competitive advantage it may generate under some circumstances if one does not pay attention.

After the threat of economic crisis in 2009, we may face in the 2010s and in the 2020s other correlation cri-

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ses that could arise from illiquidity, pandemic, inflation, oil peak, climate change, pollution, a natural disaster, etc.... To limit their financial consequences and ensure the long-term viability of our financial system, I believe we need to put more emphasis on fundamental and applied research and use continuous professional development to train ERM experts with both quantitative and qualitative expertise. These experts would be able to identify, quantify and manage risks faced by insurance and financial institutions from the underwriting process to investment strategies.

For some risks, studies with mutualized data by researchers, federations of insurance companies and banks and international institutions should be carried out to avoid blind trust in black-box models. This would help us to find out which risk indicators would be relevant for better risk management and regulation.

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## Societal Themes: Behavioral/Personal Economics

Essay on the Financial Crisis

BY ANDREW WINKLER

The Human Touch Underlying the Current Financial Crisis

BY VIVEK GUPTA

If It Looks Too Good to Be True ...

BY STEVE MALERICH

## Essay on the Financial Crisis

by Andrew Winkler

The current crisis is catalyzing an array of responses, including searching for causes, reworking regulations, scapegoating and a massive capital injection. Without a clear understanding of the cause, the remedies may do more harm than good, innocents may be scapegoated, and valuable progress in financial tools may be lost. Worse, it will happen again.

From a simple mathematical model of the underlying economics, I first predicted this crisis in July of 2004. An economic dynamic relating very low interest rates to the structure of the demand curve in the housing market made this outcome foreseeable, indeed inevitable. The current crisis had a mathematical cause. There isn't space here for full explanations; see *mattersofinterestmatters.blogspot.com*.

This much is clear to everyone—the crisis results from an epidemic level of mortgage defaults, in turn caused by ballooning monthly payments from variable rate mortgages, caused by a rise in interest rates from historically low levels. This made the monthly payment change quite large, because while the rise was small in absolute terms, it was huge in relative terms.

The simultaneous plummet in property values made default the only option. This is the effect which we must understand—why do low interest rates cause a bubble in real estate value, and why do rising interest rates burst that bubble?

Like all equilibrium pricing, there is a supply curve and a demand curve for housing. Over the short term, the housing supply can't change, so it's the demand curve that's crucial. The two central facts are these: for reasons we'll discuss, buyers buy a monthly payment, not a house price, and buyers buy as much house as they can afford.

This brings us to the heart of the matter: mortgages that require no down payment, and only interest payments, alter the structure of the demand curve for real estate, in a way that is harmless enough when interest rates are high, but which drives a bubble at low interest rates. Specifically, they

make housing prices inversely proportional to the interest rate. If interest rates are cut in half, house prices double. When those rates double, house prices are slashed in half. When interest rates are large, they are not likely to double or halve, but when interest rates are small, a small adjustment can be a big percentage change, and the danger of big swings in housing prices is appreciable, even inevitable.

With no down payment, no amortization and closing costs folded into the loan, the only issue in affording a house is the monthly payment, which is the house price multiplied by the interest rate. If interest rates are cut in half, the house you can buy with a given monthly payment costs twice as much. But the same number of people with the same income distribution are competing for a fixed stock of housing. The house price is bid up until the new monthly payment at the new interest rate matches the old monthly payment at the old interest rate. The house price varies inversely with the interest rate.

The effect is somewhat mitigated, ironically, by property taxes, which effectively raise the interest rate, but it's no accident that the bubble occurred during a time of historically low rates, and burst when those rates rose again.

This perfect storm required the confluence of a number of factors, each one of which was at worst innocuous and at best virtuous. The traditional mortgage had several features which had recently been relaxed; fixed rates were forced by unpredictable inflation rates to become variable; sophisticated credit models and rising markets made down payments and amortization less meaningful. Each of these innovations, in isolation, represents a significant advance in making home ownership affordable and available. Interest rates were low for valid economic reasons. Taken together, however, they arm a trap which springs when interest rates dip by a significant factor, and then rise again.

But that raises significant issues. Why would homeowners walk into that trap? Why would mortgage lenders? Dr. Alan Greenspan recently testified that he discovered

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a flaw in the model of how the world works, that he had relied on the self-interest of lenders to act rationally.

The market worked, however. Supply met demand.

To fully understand what did happen, and why, we need to answer three questions: Why do buyers buy a monthly payment? Why do buyers buy as much house as they can afford? Why didn't lenders see the trap, and avoid it? The short answer is that supply and demand are not magic; they're Selection at work, which tells us the limits of the model.

Economic activity is human activity is biological activity is physical activity. And physics, the body of knowledge, is simply a collection of technologies for calculating probabilities, with the key insight being the Principle of More. In biological systems, the Principle of Selection occurs in at least two distinct forms, the Principle of Natural Selection, and the less familiar, but more important, Principle of Sexual Selection.

The Principle of Natural Selection, if you recall, states that a heritable trait which confers a higher degree of probability of survival to an individual, has a higher probability of surviving in a population; while the Principle of Sexual Selection states that a heritable trait which confers a higher degree of probability of having offspring, has a higher probability of surviving in a population.

Seen in this light, maximizing utility, which drives both supply and demand, means neither more nor less than maximizing the long run number of surviving offspring. Any economic behavior that raises the probability of survival, or of offspring, which is also heritable, whether as DNA or cell structure or ideas or skills, will predominate. This makes supply meet demand, and forces the time value of money.

But nobody knows the future. Biological selection can't (or at any rate hasn't) given us the power to formulate decisions based on perfect knowledge of the future. Rather, it gives us tendencies and faculties that have, on average,

worked better in the past than the alternatives did.

Why do buyers buy as much house as they can afford? Sexual selection forces it, as does natural selection. You don't want your kids exposed to drive-by shootings or gang violence. You do want your kids to be attractive, and you know that your display of wealth will have a real impact on their attractiveness. Don't shoot the messenger—I'm not lauding that undeniable fact.

Why do buyers buy a monthly payment? There are two, related reasons. It reduces what is at heart a very complicated transaction full of unknowable future uncertainties to a single, knowable, comprehensible number. The other reason has to do with personality, itself a manifestation of Sexual Selection. Estimates vary, but around 40 percent of the population of the United States has the "Improviser" temperament, characterized by a preferred reliance on the "extroverted sensing" cognitive function, profound awareness of sensory input from the external world, creating a strong orientation to the "here and now," and a relative blindness to the past or the future. For such a person, the monthly payment is the "here and now".

Another approximately 40 percent of the population of the United States has the "Stabilizer" temperament, characterized by a preferred reliance on "introverted sensing," a deep awareness of sensory memory, creating a strong orientation to the past, and a keen awareness of standards and tradition, as well as a strong bias that whatever used to work is going to continue to work, and a high level of trust in "the system". For such a person, the fact that a mortgage product contains innovative elements would be counterbalanced by the source of those products—(formerly) large rich prestigious established institutions.

Both Stabilizers and Improvisers share a strength, in noticing details, as well as a vulnerability, in sometimes missing patterns, and in being relatively unaware of the future.

The two other temperaments, Conceptualizers and

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Catalysts, share a strength in noticing patterns, as well as a vulnerability, in sometimes missing details, and in being overly future-focused.

Which brings us to why lenders failed to see the trap. Wall Street has a strong bias for detail-focused rather than pattern-focused people. Businesses do in general. The mathematical component of the GMAT tests heavily your knowledge of Euclidean geometry, which has been essentially useless since the days of Descartes, but draws heavily on your “extraverted thinking” faculties, largely ignoring your analytic “introverted thinking” capabilities.

As such it is largely a test for identifying smart Stabilizers. Quant interviews lean heavily on “fact sheet” questions, or tricky problem solving. Einstein need not apply here! Asked what the speed of sound was, he wondered why he would bother to memorize something he could look up in an encyclopedia. In the modern world of rapid technical advance, businesses which rely solely on the Improviser’s here-and-now, real-time response have become just as vulnerable as those which rely solely on the Stabilizer’s resistance to innovation.

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## The Human Touch Underlying the Current Financial Crisis

by Vivek Gupta

This article presents a hypothesis that the market cycles are primarily created by human actions, behavior and assumptions rather than by random variables. An analysis of main financial events over the last decade reveals that:

- Every one of these events has had a human touch.
- The current financial crisis is an aftermath of the excessive economic boom during this period.
- A new economy must emerge from human ingenuity and innovation.

The B!O!O!M!

**The Internet and Y2K:** When former U.S. President Bill Clinton declassified the military technology of the Internet for public use, it created an unprecedented tech boom, millions of new jobs and a booming global economy. Microsoft President Bill Gates added fuel to this fire by hyping the concerns of Y2K. Y2K fears forced almost every business in the world, especially in the developed world, either to upgrade or to replace their computer systems. No doubt, Y2K was one of the single most powerful economic catalysts ever experienced.

**9/11:** The horrific tragedy of 9/11 caused a major meltdown of the stock markets as well as of investor confidence. At that time, the U.S. government felt compelled to lift the American economy. To do so, former Chairman of the U.S. Federal Reserve Board Alan Greenspan started increasing the supply of money to lower the interest rates. In December 2003, federal funds rates touched as low as 0.96 percent, the lowest level ever recorded in American history. This unprecedented low rate did achieve the desired intent by lifting the stock markets and the mood of America in due course.

### **The housing boom and the home equity impetus:**

Due to low interest rates, paying an additional \$10,000 for a house only meant an increase of \$40-\$50 in monthly mortgage payments. When the bankers were eager to lend a higher mortgage amount, the homebuyers started bidding up the house prices. The bankers bundled up these mortgages and sold mortgage-backed securities (MBS) all over the world to raise more cash. This iterative cycle through a never-ending supply of money resulted in ever-increasing house prices. Many homeowners borrowed against the equity of their homes and spent on renovations and travel and invested in the stock markets. This self-fulfilling prophecy created an enormous construction boom and uplifted the stock markets.

**Extrapolation of historical data to make future assumptions:** All financial players—lenders, borrowers and policymakers—believed that the U.S. house prices would never fall in the future because those prices had never fallen in the past. The lenders kept lending indiscriminately, assuming even if some homeowners default, they could recover their investment by selling the houses that were going to appreciate anyway. This assumption played a significant role in creating the recent housing boom.

### **Mathematical mirage of index returns through the smoke and mirrors of mergers and acquisitions (M&A):**

Lately, a combination of low interest rates and low credit spreads allowed high-end borrowers to borrow at, say, 4 percent. To earn a 1 percent spread, they valued the targeted stock expecting a 5 percent yield. The following example illustrates how M&A made the index returns look highly impressive.

When this stock started trading for \$120, everyone who owned the stock in 2006 got an impression of 20 percent

Time	Expected Dividend	Expected Yield	Valuation Mathematics	Stock Price
2006	\$6/per year	6%	6/.06	\$100
2007	\$6/per year	5%	6/.05	\$120

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appreciation in the “value” of their stock, whereas their income was still \$6/per year. A simple analysis of historical stock prices cannot reveal how lowering the expectations of future income created a mirage of exuberant current income. In this process there is nothing illegal or even ill-intentioned on anyone’s part.

**Fire and hay:** Intermediaries and investors: Generally, investors are averse to the guaranteed deposit returns and are so mesmerized by the historical surge in stock market indexes that they ignore the market risks and sales commissions. Intermediaries were easily steering such investors toward equities as preferred investment for their retirement. This raging bonfire was adding glow to the markets.

**Oversupply of money, yet no inflation:** Theoretically, the appropriate amount of money in the economy is that which keeps the inflation between 1 and 2 percent. The central banks have flooded the markets with money and have created enormous demand without disrupting the inflation charts. To achieve this most desirable outcome, they increased supply by liberalizing import quotas from China, India and other low-cost production regions. This phenomenon resulted in an unprecedented era of globalization, economic boom and vibrant stock markets.

The BUST

**Imbalance of production and consumption:** The fundamental reason for this recent bust is a trillion dollar (fiscal + trade) deficit. In the most fundamental trading relationship for humans, the barter, the United States has a gap of one trillion dollars. Essentially, the United States is saying to the rest of world: “Give us goods and we will pay you later.” So far the rest of the world is accumulating “savings” by exporting goods to the United States, confident one day it will get its savings back with interest.

The housing bust and halt of the home equity impetus: Prudent Alan Greenspan admitted that the housing boom was reaching the tipping point by saying “There is some froth in the housing market.” At a point when interest

rates could not be pushed any lower, the house price boom stabilized and halted the free income from home equity. The artificial economic impetus disappeared.

**Super-saturated housing market:** Due to many enticing incentives, people who would have bought a house over the next three to four years had already bought a house. When the high-risk mortgages started defaulting in large numbers, lenders suddenly realized that they could not recover their investment through foreclosure in a super-saturated housing market. Lenders’ fundamental assumption was punctured!

**The domino effect:** When lenders’ overoptimistic assumptions did not pan out as expected, lending retreated, demand retreated, house prices plummeted, MBS value fell, guarantors of MBS defaulted, credit swaps fell in the money, and the issuers of credit swaps disappeared or weakened.

**Rescue packages:** The U.S. government could take over the severely defaulted mortgages in an attempt to unlock the credit crisis. However, would the bankers find enough creditworthy homebuyers with 25 percent down payments?

**Sudden deleveraging:** Eighty percent of U.S. GDP is dependent upon the consumer expenditure, which is in parts supported by borrowing. A \$50 reduction in monthly pay means a reduction of \$10,000 borrowing capacity. A slight slowdown in the job market will significantly reduce demand for everything, from cars to trinkets. It remains to be seen how nimbly the U.S. economy can shrink.

The ...

**The ripple effects of pension shortfalls:** Due to declining stock markets and low interest rates, pension asset values have fallen and liabilities have increased. Some of this gap has to be covered from company profits this year. Due to a soft economy, profits have shrunk. Higher-than-expected pension contributions will further lower profits. This may

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result in lower credit ratings and further drops in stock prices. Since company A's stock is part of company B's pension portfolio and vice versa, more pension contributions will have a domino effect on stock prices. The defined benefit pension plans established many years ago will be hit hard.

**The demographic shift:** Developed countries are experiencing an aging population along with a slower growth in their intrinsic populations. A large segment of the working population will retire in the next few years. The economic growth is assumed to come from the increasing consumption by the stable population only.

**The environmental scare:** To some degree, most people believe something needs to be done to avoid looming environmental catastrophe. The proposed solutions either lead to job reductions or are considered ineffective. Most policymakers tend to favor jobs over the environment.

**Innovation, the last hope:** All the reasons that caused the bust have one common thread—the available capital cannot be deployed in new industries. Therefore, it is chasing a few opportunities, creating extreme volatility and

resulting in loss of wealth. As far as I can see, innovation is the only comprehensive solution that can simultaneously overcome concerns regarding environment, economy and excessive capital. We need a paradigm shift in our thought process to achieve innovations that can further lift the standard of living for all humanity by adding enormous value—for example, harnessing gravity.

**Summary:** No one is proposing ways to rectify the trillion dollar deficit that is creating a serious geopolitical shift. Optimism is good; however, too much optimism fosters complacency. It is time we realize the severity of the situation, implement a serious change in behavior and act urgently to find long-term solutions, mainly through innovation and pension reforms, to overcome the current challenges. Such solutions will not be fast and easy but rather will require virtues like leadership, hard work, courage, innovation, sacrifice, etc. If we fail to do so, either environmental or economic woes will lead to widespread catastrophe. After all, there is good news. We still have *some* time to change course.

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## If It Looks Too Good to Be True, ...

by Steve Malerich

Most people should know how to end that statement. Leading up to the current financial crisis, many looked at real estate prices in some significant areas of the United States and concluded that we were in an asset-price bubble. Yet, despite that appearance, we continued to lend money based on prices then prevalent. Now, the bursting of the bubble has sent shock waves around the world.

Although real estate can be called a trigger of the current crisis, it is only part of the problem. For years, we have lamented that people weren't saving enough. Yet, when spending slows, we forget about the need for increased savings and investment. Our attention turns to the slowing economy and we demand that something be done. Invariably, that has led to some form of stimulus to encourage increased consumption (and discourage saving).

Could it be that the depth of our current crisis is related to our failure to find an economic goal other than continuous "growth" as it's been measured for decades?

As painful as it may be, we can view the current crisis as a wake-up call. Rather than trying desperately to restore a "healthy" economy, perhaps it's time to try building a truly healthy economy—one where we don't keep promoting consumption of any and all kinds at the expense of saving and investing for the future.

America has taken a step toward long-term fiscal responsibility. We have reduced spending. The next step is not to reverse completely that movement, though some reversal may be good. Rather, we need to start moving some of the increased savings into things that will promote long-term needs.

Economic growth can come from investments targeted for long-term benefit. An obvious choice is in investments that will help to meet the needs of a substantially growing number of retirees. There are many other candidates for such investment. The physical sciences give us many warnings about things that may be too good to be true.

No doubt, some such investments will fail. Others may prove to be unnecessary. But then, investments of all types fail and solutions often abound for problems that don't materialize. Imagine the casualties among traditional investments, however, if any portions of today's warnings prove accurate.

We should not continue to promote things that have worked in the past just because they have worked in the past. There is too much evidence to suggest that at least some of these things are—too good to be true.

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## Effective Risk Modeling:

Credit Crisis Lessons for Modelers

BY PARR SCHOOLMAN

What Is a Robust Level of Risk Capital?

BY LARRY RUBIN AND XIAOKAI (VICTOR) SHI

## Credit Crisis Lessons for Modelers

by Parr Schoolman

Does the credit crisis mean the heralded Age of the Quant has passed? Much of the blame for the current credit crisis is being laid at the feet of the analysts responsible for modeling and evaluating the innovative debt securities driving the massive losses for financial institutions. How was the modeling of these securities so wrong?

An article recently published by four Federal Reserve economists, "Making Sense of the Subprime Crisis,"<sup>1</sup> provides some insight into what information was available for analysts during 2005 and 2006, the time period of loan origination associated with the most toxic segment of the subprime securities. The falsely optimistic pitch to investors could have been based upon the following points:

1. **The subprime market fundamentals were considered to be strong.** Lending in this market had evolved toward subsidiaries of large, reputable financial services companies, replacing the small, thinly capitalized lenders of the 1990s. Lenders were increasing the use of quantitative models based on credit scores for loan underwriting, which were demonstrating an improvement in average FICO scores for subprime borrowers. Furthermore, the historical performance of subprime mortgage securities had shown them to have more stable credit ratings than similarly rated corporate bonds. With increased use of automated underwriting, improved credit score transparency and more reputable lenders, the performance of subprime securities was expected to remain strong.
2. **Subprime securities were expected to have less interest rate risk than prime mortgage securities.** Prime mortgage borrowers had demonstrated a tendency to refinance their loan and pay off their existing loan when interest rates decreased. This correlation to interest rate changes was problematic for investors

because it increased the interest rate risk for these securities. Subprime loans demonstrated a more stable prepayment rate, as their refinancing tended to be less correlated with market interest rates, and more correlated with individual borrower financial difficulty. This source of prepayment was diversifiable for a large pool of independent borrowers. Furthermore, as much as 80 percent of subprime mortgages contained prepayment penalties,<sup>2</sup> further reducing the likelihood of the mortgages to be refinanced if interest rates decreased. These features reduced the perceived interest rate risk of subprime securities, making them arguably a safer investment than a prime mortgage security with the same credit rating.

3. **The strong housing market was expected to minimize the downside risk of subprime loans.** The data typically used to evaluate these securities went back to 1998. Data prior to 1998 was not thought to be as relevant due to the changes in the industry regarding loan originators and the more automated underwriting process. Unfortunately, that time period did not contain a recession, nor did it contain a period of sustained home price declines. A Citigroup December 2005 report is quoted as stating:

"the risk of national decline in home prices appears remote. The annual HPA has never been negative in the United States going back to 1992."

Home price appreciation (aka HPA) all the way back to 1992 has not been negative. What could possibly go wrong?

The basics of this story look very familiar to what occurred in the P&C insurance industry during the depths of the soft market of the late 1990s. Underwriters and brokers

<sup>1</sup> K. Gerardi, A. Lehnert, S. Sherlund and P. Willen, "Making Sense of the Subprime Crisis," Sept. 5, 2008.

<sup>2</sup> G. Gorton, "The Panic of 2007," Aug. 4, 2008.

Credit Crisis Lessons for Modelers by *Parr Schoolman*

were making assertions that the re-underwriting of books would mean that future results would be better than historical loss experience indicated. Changes in claim handling were also expected to reduce the future development that standard actuarial loss triangle methods were predicting. Management teams were proclaiming that the diversifying of their portfolios into new lines of business would reduce the risk of loss as well. Wall Street errors of the current crisis echo these soft market mistakes of the P&C industry. Both Wall Street and the insurance industry have demonstrated a propensity for underestimating risk, although the bankers seemed to have discovered a way to receive an extra zero or two at the end of their paychecks while doing so. Going forward, what can those who attempt to quantify risk for a living learn from these missteps?

First, recognize that the accuracy of a model is limited to the accuracy of the input assumptions. Complex models can provide a false sense of security, hiding the evidence that the entire range of indications may hinge on one or two key assumptions. Use data-driven assumptions, making sure the time series includes stressed environments when possible. If a model of underwriting risk indicates that the probability of accident year combined ratios experienced from 1998 to 2000 is remote, it is not a realistic model.

Second, stress test key assumptions. In most insurance risk modeling exercises, the correlation assumptions between lines of business and between other risk elements drives the tail of the results. These correlation assumptions should be transparent, while the model needs to be able to stress test the impact of increased correlation between risk elements. Each new market crisis demonstrates that correlation in stressed environments is much higher than historical averages would indicate.

Finally, understand the limits of the data being used and acknowledge the resulting uncertainty. A model built on five to 10 years of data provides limited information about a 100-year PML. Many analysts of subprime securities recognized that using data since 1998 was less than ideal and not fully representative of all possible scenarios. Extrapolating beyond the historical data, they made reasonable estimates of the potential losses to securities backed by subprime loans if home prices were to decrease. However, their biggest mistake was to underestimate the probability of U.S. housing prices dropping nearly 20 percent from 2006 to 2008 in the largest metro areas. This error demonstrates that the quantification of remote probabilities is more difficult than the quantification of possibilities.

To further illustrate this point, Nassim Taleb presents the clever story of a turkey being raised on a farm in his book *The Black Swan*. Every day of its life, when a turkey sees the farmer, it gets fed. Based upon that experience, when the turkey sees the farmer coming out of the farmhouse the day before Thanksgiving, it sees no reason to be concerned. This very big error in judgment regarding the risk posed by the farmer is driven by the fact that the turkey's prior experience period did not include a Thanksgiving.

To make sure the end users of model projections do not make the same errors in judgment as the turkey, modelers should maintain the humility to document the limits of the data underlying their model, providing transparent summaries of the key assumptions and their impact to the uncertainty of the estimates. Don't mistake modeled probabilities for real world results.

What Thanksgiving is your model potentially missing? What are you doing to address it?

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## What Is a Robust Level of Risk Capital?<sup>1</sup>

by Larry Rubin and Ziaokai (Victor) Shi

Market observers have never been as skeptical on financial service firms' capital standing as they are today. As The Hartford released its third quarter earnings on Oct. 30, 2008, its stock price fell almost 50 percent when it reported a \$2.6 billion quarterly loss. Many believe this was driven by its failure to convince the market that it was sufficiently capitalized to survive the financial crisis. The conference

call was dominated by questions on the company's capitalization level.

Their skepticism makes sense. As shown in the table below, some prominent firms have asset-to-equity ratios as high as or higher than 20, which means their \$1 in capital could leverage more than \$20 in assets. Wall Street firms and some other financial conglomerates were operating

**LEVERAGE OF TOP 25 FINANCIAL SERVICE COMPANIES IN THE UNITED STATES (\$ Billions, 03/31/2008)**

Asset Rank	Company	Industry	Asset-to-Equity	Q1 2008 Assets	Q1 2008 Equity
10	Freddie Mac	Specialty Lender	<b>50</b>	803	16
16	Bear Stearns	Broker/Dealer	<b>34</b>	399	12
5	Morgan Stanley	Broker/Dealer	<b>33</b>	1,091	33
11	Lehman Brothers	Broker/Dealer	<b>32</b>	786	25
7	Merrill Lynch	Broker/Dealer	<b>29</b>	1,042	37
4	Goldman Sachs	Broker/Dealer	<b>28</b>	1,189	43
18	FHLB of San Francisco	FHLB	<b>23</b>	332	14
8	Fannie Mae	Specialty Lender	<b>22</b>	843	39
15	Prudential Financial	Insurance	<b>21</b>	478	23
17	The Hartford	Insurance	<b>19</b>	344	18
1	Citigroup	Bank	<b>17</b>	2,200	128
14	Metlife	Insurance	<b>17</b>	557	33
21	GMAC	Specialty Lender	<b>16</b>	243	15
24	Countrywide Financial	Thrift	<b>15</b>	199	13
19	WaMu	Thrift	<b>14</b>	320	22
6	AIG	Insurance	<b>13</b>	1,051	80
3	JPMorgan Chase	Bank	<b>13</b>	1,643	126
13	Wells Fargo	Bank	<b>12</b>	595	48
12	GE Capital	Specialty Lender	<b>12</b>	684	58
22	U.S. Bancorp	Bank	<b>11</b>	242	22
2	Bank of America	Bank	<b>11</b>	1,737	156
9	Wachovia	Bank	<b>10</b>	809	78
25	Farm Credit System	Specialty Lender	<b>7</b>	197	27
23	Bank of New York Mellon	Bank	<b>7</b>	205	28
20	Berkshire Hathaway	Insurance	<b>2</b>	281	119

Source: SNL

<sup>1</sup> The views in this article only represent the authors' personal opinions. This article does not represent any statements from the organization where the authors are currently employed.

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with high leverage ratios while at the same time they assumed that they were holding enough capital based on measurement generated from their internal risk capital models. Would those internal model generated figures be sufficiently robust for financial firms to withstand unexpected losses such as the credit crisis happening today? Also what has really caused the financial crisis as well as the undercapitalization of financial firms?

What Has Caused the Problem?

In the middle of this “hurricane” of the financial crisis, insurance companies generally stand in slightly better positions than investment banks (with a few exceptions that mostly arise from businesses written by affiliates of U.S. insurers but were not regulated as insurance). The credit crisis has impacted the banking sector more than the insurance sector. One of the reasons might be because they are under different regulatory environments. The insurance industry differs from banking in terms of the regulatory requirements of capital required. In the United States, the regulators have enforced risk-based capital (RBC) law, which requires insurers to hold minimum capital requirements according to calculations using a series of factors provided by regulators. Companies need to have an RBC ratio (total capital after slight adjustments over minimum requirement) of greater than 150 percent to avoid any regulatory actions. Insurers are generally holding two to four times the minimum RBC requirements for a targeted rating. This regulation has helped the insurance industry by setting up one bottom line of capitalization level across the industry. While U.S. risk-based capital is a crude and one-size-fits-all solution, the fundamental premise is that capital should be sufficient to enable a company to mature its future obligations.

However, investment banks are not as regulated as insurance companies in the United States. The credit default swap (CDS) market was nearly unregulated before this crisis. Firms like Bear Sterns, Merrill Lynch, Lehman

Brothers, Washington Mutual, Fannie Mae and Freddie Mac had to face the reality of either filing for bankruptcy or selling themselves (to the government or other companies). This is largely because of the difficulties in funding their capital gaps. Regulated insurance companies, although also lacking capital access under current market pressure, had better capital strength to begin with and so far have been able to survive based on private sector solutions rather than purely relying on government bailouts. This is because 1) the capital gap is smaller; and 2) their core insurance operations are healthy and therefore attractive to private investors.

Regulation, especially of minimum capital requirements, plays a key role in preventing the trains from moving off their tracks. However, is more regulation the answer, or is the current problem a result of flawed regulation? In the past, we occasionally heard complaints of the over-regulation of federal banking regulators on investment and non-investment banks. However could it be true that federal regulation enforced burdensome regulatory rules resulting in only increased workloads on financial reporting processes, while neglecting some basic principles of capital requirements?

It is the authors’ contention that it was not greed that led to the financial crisis but inadequate capital that followed from a flawed risk management strategy. Without an industry-wide capital framework, financial firms have been overrelying on their internal economic capital (EC) models to make their capital funding/allocating decisions. But they made three faulty assumptions: 1) they are adequately capitalized if they hold capital at the level their EC model has calculated; 2) EC models, which rely on historical experience as input, are sufficient to enable them to survive unexpected losses; 3) EC is the capital needed for the company to survive until the company can recapitalize (one year). We believe if companies had adequately considered the market price of risk in determining their economic capital, the credit crisis might have been avoided.

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Market Price of Risks

Markets price risk even though risks may not be traded in a deep and liquid market. Investors require margins when they choose to lend or invest their money. This margin decreases or increases depending on investors' pessimism and optimism, as well as changes in their risk aversion. Over the longer term, this margin becomes the excess of the company cost of capital over risk-free rates. A company creates additional value for its investors if the return on economic capital exceeds the cost of capital.

Can we purely utilize an internal model (that relies on historical loss data) to establish economic capital? To what extent does the market-priced risk impact economic capital?

The "standard" or most popular definition of economic capital is defined as the amount that an insurance company needs so that it can absorb all losses within a one-year time horizon with 99.5 percent probability. This definition is currently contained in the CFO principles for MCEV and in Solvency II. We considered how this level compares to market price of risks. In other words, is economic capital under this definition truly economic (i.e., consistent with the market)?

We compared the standard definition of economic capital to the market price of risk by analyzing an A-rated bond. Using historical default rates and rating transition probabilities published in Moody's study,<sup>2</sup> we simulated the loss distribution of this bond. Capital was set equal to the 99.5 percentile of this distribution over average loss (i.e., the 50th percentile of credit losses) over a one-year period. We further ran the model using a five-year time horizon. We then compared this to economic capital as determined by the market price of risk (described above). Under this approach, the average excess historical spread over expected defaults was the market-consistent return on capital (for

A-rated bond issuers). Using a cost of capital of 9 percent, we solved for the market implied economic capital. The results of the analysis are shown below.

Basic Points of Notional Amount	
Market price Economic Capital	265
99.5% Percentile over one year	65
99.5% Percentile over five years	122

The conclusion is clear. The economic capital defined under Solvency II is significantly lower than the market implied economic level of capital. Even under five years' loss (Solvency II defines one year) time horizon, the internal EC is still lower than the market priced number although it is closer. We believe there are a number of reasons for this difference:

1. The historical data represents only one sample of potential outcomes that could have happened and is not necessarily the mean.
2. The market is pricing risks that are currently unknown (such as black swans and paradigm shifts).
3. Economic capital modeling may have failed to adequately consider the level of liquidity risk that is priced for in the market.

Failure to reflect the market price of risk in economic capital calculations may have resulted in the undercapitalization of the banking industry. If the industry replaces RBC with the currently Solvency II defined risk capital, we may foresee an undercapitalization and increasing failures in the insurance sector in the future. While we do not conclude the 265 basis points is the correct level of economic capital, as this price can include other factors such as cost of funds for potential purchasers or the assets, frictional costs and tax liabilities, we do conclude that the large disconnect between the market price of risk and the

<sup>2</sup> "Corporate Default and Recovery Rates, 1920-2007," February 2008, Moody's.

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Solvency II definition should lead to risk managers questioning whether their economic capital models are properly reflecting all the risks. We believe that for the regulatory framework to become more economic and thereby promote a healthier industry, the definition of economic capital under Solvency II needs to be an improvement over the one-size-fits-all definition contained in U.S. RBC. In order for it to be an improvement, it should be modified to reflect as a key input the market price of risk, and it should adopt the RBC definition that capital exists to mature an obligation.

Establish Robust Risk Capital Strategy

The authors agree with Greenspan's remarks recently made in the *New York Times*, "Bad data hurt Wall Street computer models," Greenspan said, "... whole intellectual edifice, however, collapsed in the summer of last year because the data inputted into the risk management models generally covered only the past two decades a period of euphoria... ."

Political figures and journalists have tended to blame deregulation and greed for the credit crisis. However, we would like to suggest that these were not the primary cause of the credit crisis. The real cause of the crisis was faulty regulation and arrogance. Flawed regulation in the over-

reliance on complicated capital models and arrogance in believing that the complex mathematical formula in risk models overcame the limitations on input availability and enabled companies to capture returns that were greater than the cost of capital, have led Wall Street (by creating CDOs and similar instruments) to repackage risks and take out the systematic excess risk charges as profits, and have also allowed companies to run "prudently" on leverage ratios that were in hindsight over the limit. If some of the broker dealers that were running over 30-to-1 leverage ratios had reflected the market price of risk, they might still be around today. Establishing an "economic" solvency and performance framework based on the presumption that we are smarter than the market is not economic and is both fatally flawed and fundamentally unsound. The objective of performance reporting should be to judge whether we truly were smarter than the market and not to presume it up-front.

Almost every recently failed firm was perceived as a sophisticated risk manager. We wish those painful failure examples would evoke more consideration over a system that might be fundamentally flawed rather than blaming individuals who were unlucky in being the last executives of their fallen companies.

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## Insights from the Insurance Industry:

Seven Simple Lessons from Two Actuaries on the Mortgage Crisis

BY RANDY ROTH AND JOHN PIERCE

An Industry in Question, a Profession with Answers

BY JAMES RAMENDA

The Financial Crisis: An Actuary's View

BY LOUISE FRANCIS

Actuaries Would Have Made a Difference

BY W. JAMES MACGINNITIE

## Seven Simple Lessons on the Mortgage Crisis from Two Actuaries

by Randy Roth and John Pierce

We have been observing the mortgage crisis over the recent months. To some extent, we are like Will Rogers in that all we know about the crisis “is what we read in the newspapers.” Even though we lack the practitioner’s in-depth knowledge of the mortgage industry, it does seem to us that lessons we have learned in the property-casualty insurance industry have relevance to the mortgage crisis. These seven lessons—based on admittedly imperfect understanding of the exact structure of the underlying mortgage industry—are listed below:

### **1. Never Assume Someone Else Will Serve Your Own Interest Better Than You Will.**

In the property-casualty insurance industry, we know that managing general agents (MGAs) have interests which are different than the interests of the insurance company. Because of this, it is standard practice to establish incentives that align the interests of the MGAs and the insurance companies. Commonly, an MGA is required to “have some skin in the game”—either by retaining a share of the business it produces through an agent-owned captive or by a commission structure that is responsive to its business’ loss experience.

In this mortgage crisis, it appears mortgage brokers and mortgage originating banks were similar to unchecked MGAs. These brokers and banks had an incentive to produce mortgages that would generate fees for them. Those mortgages would then be sold to investors, generating additional fees—but it appears there were often no incentives to align the interests of those mortgage producers with the purchasers of these mortgages. The brokers and banks “did not have any skin in the game.”

### **2. It Is Always a Recipe for Disaster When a Secondary Market Risk-Taker Fails to Adequately Comprehend and Evaluate the Risk Being Accepted from a Primary Marketplace.**

There have been instances where a naïve reinsurer will take small shares (1 percent or 2 percent) of several larger

reinsurance treaties, and will then justify its actions by saying “How can we be hurt too badly? We are only taking a small share.” In some cases, additional layers of reinsurers took a share of the first reinsurer’s business. This process was labeled the “reinsurance spiral.” These naïve reinsurers often learned just how badly they could be hurt by these “small shares” of the underlying business. In these cases, there was no substitute for making your own analysis of the ultimate profitability of the underlying reinsurance treaties.

Similarly, investors who relied on the various rating agencies or the reputations of the originating banks to determine which mortgage-backed securities (i.e., combinations of small slices from many individual mortgages) to purchase now understand that there is no substitute for doing one’s own analysis of an investment risk.

### **3. Don’t Confuse Dispersion with Diversification.**

From our experience in the insurance industry, we know a diversified pooling of non-correlated similar exposures does reduce risk for the pool and does achieve greater predictability of pooled outcome. However, mortgage securitization appears to have led to global dispersion of pools consisting of relatively little slices of mortgage risk that were positively correlated. The risks in the pools of mortgages may have been dispersed—but they were not diversified in any meaningful sense. When trouble hit the entire U.S. real estate market, each of the little slices in these mortgage securities was impacted.

### **4. Never Assume That There Is Only One Cockroach.**

From our experience with loss reserve problems, we have learned that oftentimes the first estimate of a major problem proves to be optimistic. Often further emergence of loss reserve deficiencies shows that the initial estimates of the problem’s size were too low. In “actuarial” terminology, we say “there is never only one cockroach.”

It appears many financial firms did not understand this concept of “one cockroach”—as their initial estimates

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of losses due to the mortgage crisis generally have been revised upwards several times.

**5. You Can Fool Some of the People Some of the Time but...**

Many smart people have devised clever and complicated schemes to camouflage risk, but it always results in a game of musical chairs where someone loses when the music stops. For example, Lloyds has a complicated three-year accounting practice with an assumed likelihood of a syndicate's ability to purchase closing reinsurance. While this complicated structure served Lloyds well for many years, it eventually failed to protect naïve investors from the ravages of U.S. asbestos and pollution liabilities.

It appears that many of the mortgage securities that were purchased by investors were relatively complicated in their structure. In retrospect, one can wonder whether this complicated structure camouflaged the underlying risk in these instruments.

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**6. The Regulator Is Not Always Your Enemy**

While compliance with the insurance regulatory process is often burdensome, we know it may force us to recognize a problem that we would not otherwise recognize. If the regulators of our banking industry had been as rigorous as the regulators of our own insurance industry, perhaps this mortgage crisis would never have happened.

**7. Risk Assessors Need a Proven Record of Professionalism, Credibility and Objectivity**

The current mortgage crisis plus earlier financial collapses this decade have severely damaged the reputations of credit rating firms, the banking industry and other risk-assessing professionals. As a result, it will take much time and effort for risk assessors to restore customer confidence and trust.

While the actuarial profession is not free of any blemishes in this arena, actuaries as a whole take pride in their professional accomplishments. Our profession has taken steps to protect and enhance our reputation, and these recent experiences demonstrate the need that we continue to do so.

## An Industry in Question, A Profession with Answers

by James Ramenda

The current financial crisis is sometimes described as a process of “washing away” economic excesses. Yet for a widening range of industries, it seems that more than just excesses are being washed away. Major companies, long-standing ways of doing business and thousands of jobs are disappearing, seemingly overnight in some cases. Today’s constant flow of information and the globalization of markets reinforce the “real time” nature of the crisis. Balance sheets are viewed as trading positions, marked to market with each new data point.

Among all financial institutions, insurance companies may be the least strategically suited to this environment because of the potentially decades-long nature of their liabilities. And among insurance companies, life insurers face particular pressure owing to three characteristics of their business: (1) they have the longest duration liabilities, i.e., permanent life insurance and long-term annuities, (2) these are demand liabilities, and (3) these lines have the highest asset leverage relative to capital. The leveraged effect on balance sheets has been severe, with equity accounts of many major publicly traded life insurers down 20 percent or more through nine months of 2008 and likely to fall further by year-end. The S&P 500 life insurance component is off more than 50 percent in 2008 through mid-November, and several companies have suffered substantially more severe declines. Whether the market’s harsh judgment will prove correct in the long term is anyone’s guess at this point, but at a minimum the crisis is raising some new questions for the industry.

The central question is that of viability. Specifically, is the configuration of life insurers’ products and balance sheets economically viable under current accounting and ongoing market conditions? Life insurers make long-term investment guarantees in their life and annuity policies. The assets backing these products are chosen to mature the liabilities over the long term, not to match them in value moment to moment. The result is that interim swings in equity can be large, but not necessarily meaningful to a com-

pany’s ability to meet its obligations and produce a profit. Indeed, no major life insurer has reported difficulty paying claims or meeting solvency requirements to this point.

In theory, the impact of a market-driven decline in equity is dampened by statutory accounting principles, which judge solvency based largely on historical cost measures. Even under GAAP, such a decline theoretically is balanced to some extent by the prospect of higher future earnings due to widened spreads. However, the reality of the marketplace is that a sizeable decrease in book value brings other consequences: ratings downgrades, short-selling raids, potential runs on the company, distressed asset sales and discounted capital raise-ups. Under such stress, a company may need to sustain itself by selling deeply discounted assets and raising capital at highly dilutive terms, actions which sharply reduce future profitability.

Moreover, even if the recent severe declines in equity prove to be temporary, insurers will still need to incorporate the observed market data into their forward-looking risk management scenarios, e.g., the VIX above 60 (and surging to nearly 90); investment grade bond spreads up to 500 basis points; performing AAA commercial mortgage spreads of 600 basis points. Perhaps these extremes reflect “fire sales” conducted by severely distressed sellers, but they cannot be discounted as 1-per-1,000-year events, “black swans,” or “Great Depression” scenarios. Recognition of increased risk will require deleveraging of the life insurance business, as is occurring in other financial industries.

Deleveraging can be accomplished through capital-raising, but at the present time the public markets are not accommodating. Many leading companies are trading at fractions of their book values, some as low as 20 percent (of book value as stated, i.e., reflecting fair value accounting). The debt of some household names in the industry trades at junk bond spreads despite investment grade ratings. It may be that markets simply distrust insurers’ balance sheets, or are discounting still worse days to come. Perhaps markets

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are simply in a panic, but it is noteworthy that generally higher valuations are being awarded to property-casualty and certain health insurers vs. life insurers, these having shorter duration business, no demand liabilities and lower asset leverage. Markets may be rendering their verdict on the question of viability of the underlying business, i.e., they won't provide the capital to support long-term investment-based liabilities underwritten by life insurers.

With private capital not forthcoming, it is likely the life insurance industry will join the banking industry (and perhaps other industries, e.g., auto manufacturers) and recapitalize through direct investment from the U.S. Treasury. It has also been suggested that insurers receive FDIC-type backing to shore up policyholder confidence. If these steps were taken, it would be reasonable to assume that the time for federal regulation over insurer solvency would be near. As with banks, if the federal government is going to backstop an industry, it is going to have a greater regulatory say. Though once resisted by much of the insurance industry, many companies would now welcome a move toward this Canadian-type approach to regulation. It might also be logical to expect greater regulation of insurance holding companies to monitor the build-up of risk to the enterprise at that level.

Whatever its form, future regulation will almost certainly reinforce deleveraging. If so, insurers will need to back their risks with more capital, reduce the guarantees they provide, limit the risks they cover and attempt to increase their prices to maintain returns. For economists, this suggests a lower equilibrium quantity point for risk transfer. In everyday terms, it means less coverage for breadwinners, less income for retirees and less continuation for businesses.

Of course, in addition to their risk-bearing function, insurers are also investors. And being long-term businesses, they are by definition among the few long-term investors remaining in the world. Historically, insurance companies were among the buyers of last resort for distressed proper-

ties, able to buy, hold and manage these assets when few others could or would. In the Great Depression, many insurers ended up owning vast swaths of land and innumerable commercial and apartment buildings, property which eventually proved highly valuable and contributed to the foundation of many industry giants. But even before the current economic crisis, the ability of insurers to act in this capacity had already become limited by fair-value accounting measures (FAS 159 and its forerunner, FAS 115) due to the potential wide swings in market value such assets entail. Insurers seem destined to be even more risk-averse investors in the future.

All of this is not to pass judgment as to whether fair-value accounting is inherently good or bad, or whether more regulation is inherently good or bad. Rather, it is simply an observation that changes to accounting rules have tended to diminish the industry's ability to act as a long-term stabilizing force in the economy. The depth of the current crisis and the capital markets' dire assessment of the industry may put a permanent stamp on this trend.

For many of us in the industry, this seems like a sadly counterproductive outcome. But we have to answer critics who would argue that had the industry been more risk-averse, it would not be verging on a bailout from taxpayers. This is a pivotal moment for the industry. The actuarial profession needs to be heard in several key areas:

1. Determine whether the industry's business model (i.e., current products, investment practices, capital ratios, holding company leverage standards, etc.) is viable in view of ongoing capital market conditions. This includes examining the impact of fair value accounting and whether it has created additional risk or simply identified it.
2. Every effort must be made to see that the profession's analyses inform the development of future regulation, including the form, terms and amounts of potential capital infusions or guarantees from the government.

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3. Develop a system of reporting the financial condition of life insurers that would replace the tangle of GAAP statements, “non-GAAP” measures and statutory statements with a single set of highly transparent financial statements. Such statements should include a unified set of experience assumptions, a validation of the assumptions using actual experience and explicit means of reconciling measures used in the capital markets with those used in the determination of solvency. This will necessarily mean the transformation of solvency accounting from a separate set of principles to a set of transparent adjustments to prevailing GAAP.

Public markets doubt the viability of the life insurance industry’s business model. It is possible policyholders may someday follow suit. For the actuarial profession, this is a challenge on par with the need for Social Security and Medicare reform. It must provide the objective tools and analysis needed to either reaffirm or re-establish the viability of the life insurance industry.

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## The Financial Crisis: An Actuary's View

by Louise Francis

In a recent Casualty Actuarial Society VALCON<sup>1</sup> list e-mail, Gary Venter distributed foreclosure rates for cohorts of subprime mortgages organized by origination year. Venter noted that when the data are transposed, they have the form of a loss development triangle, a standard tool applied by property and casualty actuaries to estimate ultimate liabilities. He provided some qualitative insights and conclusions that could be drawn by an actuary from the information. Below is a further elaboration of insights that can be drawn by applying actuarial techniques to the data. The insights derived from the data are augmented by results from recent publications on the topic of subprime mortgages. The author's conclusion is that subprime mortgages constituted a Ponzi scheme and could have been avoided.

The foreclosure rate data is presented below with one adjustment to the original data: the values on the diagonal, which were evaluated as of September, and thus were divided by 0.75 to bring them to an annual basis, consistent with all the other entries. For the adjustment to be reasonable, the foreclosures must occur uniformly throughout the year. That this assumption may not hold is a limitation on the analysis affecting the uncertainty of results. (See Table 1 below).

When the data is transposed, so that rows represent year of origin, and columns represent development age (the number of years after the origin year, with one denoting the origin year), the loss development factor method, also known as the chain-ladder method, can be applied to estimate ultimate foreclosure rates for each origin year. An estimate of these ultimate rates may provide insight into the magnitude of the subprime mortgage problem. In order to apply the chain-ladder method, cumulative foreclosure rates are needed. These are derived from the calendar year incremental rates for each cohort and are shown in Table 2.

Table 3 displays the age-to-age factors, or the factor needed to bring the cumulate rate as of a given age for a given year to a maturity of one year beyond the given age.

At the bottom of Table 3 are the age-to-ultimate factors. These are the cumulative product of the age-to-age factors starting from the oldest maturity and working backwards to the youngest maturity. They are a key component of the estimate of ultimate rates. As foreclosure rates as of nine years (the oldest year for which we have data) from origination do not appear to be at ultimate (i.e., further development will likely occur), a "tail factor" is needed.

TABLE 1

		Origination Year								
Foreclosure Year		1999	2000	2001	2002	2003	2004	2005	2006	2007
0		0.013	0.015	0.019	0.011	0.008	0.009	0.010	0.026	0.040
1		0.063	0.069	0.072	0.055	0.041	0.039	0.064	0.103	
2		0.055	0.060	0.058	0.046	0.031	0.017	0.062		
3		0.049	0.034	0.042	0.024	0.022	0.025			
4		0.023	0.025	0.019	0.016	0.011				
5		0.021	0.012	0.012	0.008					
6		0.008	0.007	0.006						
7		0.006	0.004							
8		0.003								

<sup>1</sup> The VALCON list is a list sponsored by the Committee on the Theory of Risk of the Casualty Actuarial Society and is a list that is subscribed to by actuaries and insurance professionals. The community of subscribers share research, ideas and musings related to the Valuation of Contingent obligations.

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The inverse power curve described by Sherman (Sherman, 1987) was used to estimate this tail.

Table 4 displays the application of the age-to-ultimate factors, to the diagonal (as of year-end 2007) cumulative foreclosure rates to estimate ultimate foreclosure rates for each origination year. Using the chain-ladder technique, foreclosure rates are estimated to be in excess of 40 percent for 2006 and over two-thirds for 2007.

Estimated ultimates derived from the chain-ladder method, or any other actuarial development techniques,

are very uncertain. The estimates are considered especially unstable for data of low maturity, such as that of the 2007 and 2006 years. Moreover, some of the assumptions underlying the chain ladder may be violated, adding yet additional uncertainty to the estimates.

Venter (1998) describes techniques that can be used to test whether the chain-ladder assumptions are violated. One of the tests involves an application of regression analysis.<sup>2</sup> When this test was performed, the age 1–2 (also referred to age 12 months to 24 months) factor violated the chain-ladder assumptions. As a result,<sup>3</sup> the analysis for the 2007

TABLE 2

Cumulative Default Rates @12/31/07									
Development Age									
Year	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000
1999	0.013	0.076	0.131	0.179	0.202	0.223	0.231	0.236	0.239
2000	0.015	0.084	0.144	0.177	0.202	0.214	0.221	0.225	
2001	0.019	0.090	0.148	0.191	0.209	0.221	0.228		
2002	0.011	0.066	0.111	0.135	0.151	0.158			
2003	0.008	0.050	0.081	0.103	0.114				
2004	0.009	0.048	0.064	0.089					
2005	0.010	0.074	0.136						
2006	0.026	0.128							
2007	0.040								

TABLE 3

Age-to-Age Factors									
Development Age									
Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	Tail
1999	5.869	1.714	1.371	1.128	1.101	1.035	1.024	1.012	
2000	5.573	1.719	1.233	1.141	1.059	1.033	1.018		
2001	4.876	1.644	1.285	1.099	1.056	1.029			
2002	6.150	1.691	1.213	1.116	1.052				
2003	6.049	1.627	1.276	1.107					
2004	5.570	1.344	1.383						
2005	7.577	1.845							
2006	5.005								
Average	5.834	1.698	1.294	1.118	1.067	1.032	1.021	1.012	
Selected	5.800	1.700	1.300	1.100	1.067	1.032	1.021	1.012	1.0453
Age to Ultimate	16.779	2.893	1.702	1.309	1.19	1.115	1.08	1.058	1.0453

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year was adjusted. The results are shown in Table 5. Using this adjustment, the estimated rate for 2007 exceeds 50 percent. Note that the use of this adjustment addresses the violation of certain assumptions underlying the chain-ladder technique. It does not significantly reduce the uncertainty in the estimates, which, given the sparseness and variability of the data and the crude assumptions needed to adjust the

2007 foreclosure year's rates to an annual basis, is quite large. (See Table 5 below).

The estimates in Table 5 based on the chain ladder (with adjustment) show a dramatic increase between 2004 and 2007. Under a scenario of real estate price depreciation, such default rates could be expected to be ruinous. According to Demyanyk and Hemert (2008), the deterioration in

TABLE 4

Default Rates Developed to Ultimate			
Year	Current Year End Default Rate	Age To Ultimate	Ultimate Default Rate
	(1)	(2)	(3)=(1)*(2)
1999	0.239	1.058	0.253
2000	0.225	1.058	0.238
2001	0.228	1.080	0.246
2002	0.158	1.115	0.177
2003	0.114	1.190	0.136
2004	0.089	1.309	0.117
2005	0.136	1.702	0.231
2006	0.128	2.893	0.371
2007	0.040	16.779	0.673

Notes: (1) All rates adjusted to 12 month basis by dividing by .75

TABLE 5

Default Rates Developed to Ultimate			
Year	Adj Current Year End Default Rate	Age To Ultimate	Ultimate Default Rate
	(1)	(2)	(3)=(1)*(2)
1999	0.239	1.058	0.253
2000	0.225	1.058	0.238
2001	0.228	1.080	0.246
2002	0.158	1.115	0.177
2003	0.114	1.190	0.136
2004	0.089	1.309	0.117
2005	0.136	1.702	0.231
2006	0.128	2.893	0.371
2007	0.187	2.893	0.540

Notes: (1) 2007 rate adjusted to age 24 using: .02 + 3.129 \* Age 1 rate + age 1 rate

<sup>2</sup> The incremental rates for a given maturity are regressed on the cumulative rates for the prior maturity. If the constant is significant, and/or the coefficient is not significant (typically at the 95 percent level), the assumptions are likely to be violated.

<sup>3</sup> The fitted age 1-2 regression parameters were used to adjust the 2007 rates to age 24, and then the chain-ladder technique was applied.

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foreclosure rates should have been known to the mortgage lenders as early as 2005. Their analysis applied logistic regression to loan level data and found that the quality of loans declined for six consecutive years: "Problems could have been detected long before the crisis, but they were masked by house price appreciation."

Moreover, the problem with subprime mortgages appears to be inherent in their design, as they were not designed to be held to maturity, with interest and principal being completely discharged by the debtor. According to Gorton, serial refinancing was intended and built into the product when the mortgages were sold. To protect the lender from the "risky borrower," the loans were structured to be held for a relatively short period (two to three years) and then refinanced. As price appreciation of the underlying asset was expected, the refinancing was anticipated to occur before the rates of an ARM or of a mortgage with an initial teaser rate were adjusted upwards and the mortgage payment exceeded the debtors' resources. However, the refinancing was at the option of the lender, so if houses failed to appreciate, the borrower faced the risk of being stuck in a mortgage that under any realistic scenario exceeded his/her ability to pay. According to Gorton, "The appreciation of the house became the basis for refinancing every two to three years."

The scenario is reminiscent of another speculative bubble based on the expectation of real estate price appreciation without end, and the anticipation of fantastic wealth based on the appreciation. The scheme is described in some detail by John Kenneth Galbraith in his landmark book, *The Great Crash*. The real estate bubble occurred in Florida (one of the states most seriously affected by the latest real estate bubble), a state with a congenial winter climate, where people of means were expected to avail themselves of an improved transportation system and spend their winters there in increasing numbers. Land was bought sight

unseen, motivated by the belief that it would be resold at a handsome profit. In Galbraith's words, the real estate investors "proceeded to build a world of speculative make-believe. This is a world inhabited by people who do not have to be persuaded to believe, but by people who want an excuse to believe" (p. 8). One of the principals in the debacle was Mr. Charles Ponzi, and the scenario came to be known as a "Ponzi scheme."

It is the belief of this author that the subprime mortgage mess was none other than a Ponzi scheme repackaged into 21st century financial engineering clothes. What makes this scheme particularly disastrous is that the 21st century Ponzi mortgages were packaged and sold to investors and then trillions of dollars of derivatives were constructed based on the underlying mortgages, magnifying the problem by orders of magnitude.

The most brilliant analysts can run their option pricing, value-at-risk and dynamic analysis models to their hearts' content. If the founding principle underlying an investment is that of a speculative bubble scheme, the scenario is virtually guaranteed to come to a bad end.

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## Actuaries Would Have Made a Difference

by W. James MacGinnitie

In the current financial markets turmoil, it is tempting to ask whether things might have turned out differently. ‘What if’ questions were a favorite of a history professor under whom I once studied. They of course are speculative, but in this case I think the pain in our financial markets would have been less if more actuaries had been involved. I offer 10 reasons:

1. Actuaries understand that the distribution function for most risks is not the bell curve or normal distribution, but rather one of several distribution functions that have longer, fatter tails. Too much of the risk analysis in capital markets used value-at-risk, which is based on the normal distribution. That makes it easy to manipulate mathematically, but it usually understates the chances of bad outcomes, both in frequency and in amount. Actuaries working in catastrophe reinsurance, and in coverages impacted by large verdicts, understand that large but infrequent events (‘Black Swans’) need to be included in the model.
2. Actuaries understand that while choosing the right model is very important, it’s even more important to calibrate it appropriately. A rich, long-term data set needs to be analyzed, not just the trades from the last few months. And extreme events shouldn’t be excluded on the basis that “that will never happen again.” In some actuarial models, such as catastrophe reinsurance, the only thing that really matters is the fat tail that encompasses those extreme events.
3. Actuaries understand ‘model drift.’ Most accounts of the subprime meltdown report that mortgages issued before 2005, and into 2006, have performed as modeled. Later issues have not, because underwriting standards deteriorated. Actuaries know that when underwriting standards are lowered, worse experience results, and should be reflected in the price, and in any reserves set aside to pay losses. And they are trained to inquire about changes in underwriting and other aspects of operations that might have an impact on experience. Because they are trained in all aspects of the enterprise, they are well-grounded in what questions to ask of whom, and they quantify model drift and current relevance.
4. Actuaries understand spirals, and seek to avoid them. A recent example is the business of worker’s compensation ‘carve out,’ when much of the medical and time loss coverage in worker’s compensation policies was reinsured in increasingly complex structures, akin to the derivatives of derivatives that are part of the current problems. The basic proposition was to take a business that was marginally profitable at the mine face, and by packaging, slicing, dicing and repackaging, with managers and brokers getting paid every step of the way, turn lead into gold. It didn’t work in that case, but it did lead to common prohibitions of reinsurance on reinsurance (derivatives on derivatives). Had similar prohibitions existed in the derivatives markets, a great deal of pain could have been avoided.
5. Actuaries are accustomed to developing values for liabilities where no deep liquid market exists, such as pension obligations, long-term care insurance and lawsuit liability. They frequently develop values for claims that have not yet been reported to the insurer. Similar techniques would be useful for many of the assets that are currently being marked to nonexistent market values. While such values would necessarily be uncertain approximations, they would be more realistic than those quoted by someone who wants to avoid acquiring the asset at any price.
6. Actuaries are used to taking a long-term view. With pension obligations extending for decades, as do life insurance policies and benefits, and also long-tailed casualty coverages, actuaries have to think about how things will play out over the long term.

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7. The Actuarial Control Cycle is a well-developed concept that would be helpful in the capital markets. In simple terms, it requires the actuary to model expectations, then measure actual results and use those measurements to recalibrate the model. This kind of feedback loop helps adjust course before the ship hits the sand. The model can be complex, with different feedback loops and frequencies. Too much of the capital markets is based on daily procedures, which can cause one to lose sight of both the forest and the trees by focusing on twigs.
8. Actuaries are accustomed to transparency. Their regulators require it. Their professional standards require an actuarial report to back their opinion, and it must contain sufficient detail so that another actuary can appraise the conclusions.
9. Actuaries have professional standards. They should only do work for which they are qualified. They should follow professional guidance from their accrediting organizations. They must continue their professional education to maintain currency. They are subject to a discipline code.
10. Actuaries accept a quasi-fiduciary obligation. Since the pension plans and insurance companies they customarily serve will need to deliver on their promises many years into the future, paying benefits to survivors and retirees, actuaries understand that they have an obligation to do their best to make sure that those benefits will be paid when they are needed. The contrast to the trader's mentality is stark.

Actuaries aren't perfect. There are examples of insurers and pension plans that failed, but the frequency is relatively small, and in many cases it was in spite of the actuary's advice.

As regulators, legislators and central banks seek to design a better future, it would be helpful to include more actuarial training and thinking.

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