



MANAGING RISK IN THE AFTERMATH
OF THE WORLD TRADE CENTER
CATASTROPHE



Risk Management Solutions

SUMMARY

For over a decade, the insurance industry has grown increasingly sophisticated in its ability to understand and manage risk. Following a string of natural catastrophes from 1989 to 1994, insurers - reinforced by the activities of modelers, rating agencies, reinsurers, and the capital markets - made it a priority to quantify their risk and manage their exposures to acceptable levels. More recently, industry leaders have begun to take a more holistic view of risk, capital, and return by implementing enterprise risk models based upon methodologies such as Dynamic Financial Analysis (DFA), Value-at-Risk (Var), and Risk Adjusted Return-on-Capital (RAROC).

However, the World Trade Center (WTC) disaster, as the industry's first super-CAT, has illuminated the risk management landscape and has challenged all parties to revisit many long-held assumptions about catastrophe and enterprise risk management. Current estimates by Risk Management Solutions (RMS) indicate that the total insured loss from the disaster may approach or even exceed, \$52 billion. This level of loss is unprecedented for any single event, exceeding Hurricane Andrew (\$18 billion, 1992) and the Northridge Earthquake (\$15 billion, 1994) by as much as a factor of three.

Data on extreme events are rare by definition, and the unprecedented level and breadth of loss is forcing in to the open the issues that have long been discussed largely only among specialists in the risk management community. What is a Probable Maximum Loss (PML)? What is the correlation between catastrophe claims and the value of assets needed to make the payments? To what extent is reinsurance recoverable in the aftermath of a super-CAT? And, is the industry adequately capitalized and prepared to support its risk accumulations?

While it will take years to reconcile the full impact of the WTC event on the insurance industry, this paper explores these enterprise risk management issues through the lens of the WTC catastrophe and its unfolding consequences on the global property and casualty (P&C) industry.

REVISITING PROBABLE MAXIMUM LOSS

At the most basic level, managing catastrophe risk involves ensuring that insurers and reinsurers are able to remain viable following losses from a 'probable maximum' event. For the most part, insurers and reinsurers approach PML management by planning for the eventuality of a large *natural* catastrophe, and have quantified their risk accordingly. Over the years, a loose standard has emerged¹, with insurers and reinsurers managing their accumulations to fall between the 100 and 250-year earthquake and/or windstorm loss per the modeled exceedance probability (EP) distribution.

Figure 1 below provides the EP distribution for natural hazard risk for the U.S. P&C Industry, as modeled by RMS. From this distribution, Industry PMLs measured at the 100 and 250 year return period are \$53 billion and \$69 billion, respectively. By this measure, the WTC disaster, while not a natural catastrophe, will generate a level of loss consistent with the PMLs anticipated by most insurers and reinsurers. Similarly, rating agencies believe that while some specific firms may be challenged, the industry as a whole will be able to handle the claims from the WTC event without significant disruption. On October 8, A.M. Best stated that the industry "as a whole will be able to meet its commitments." Accordingly, on September 25, Standard & Poor's indicated that they do not expect to see significant disruption unless losses exceed \$50 billion.

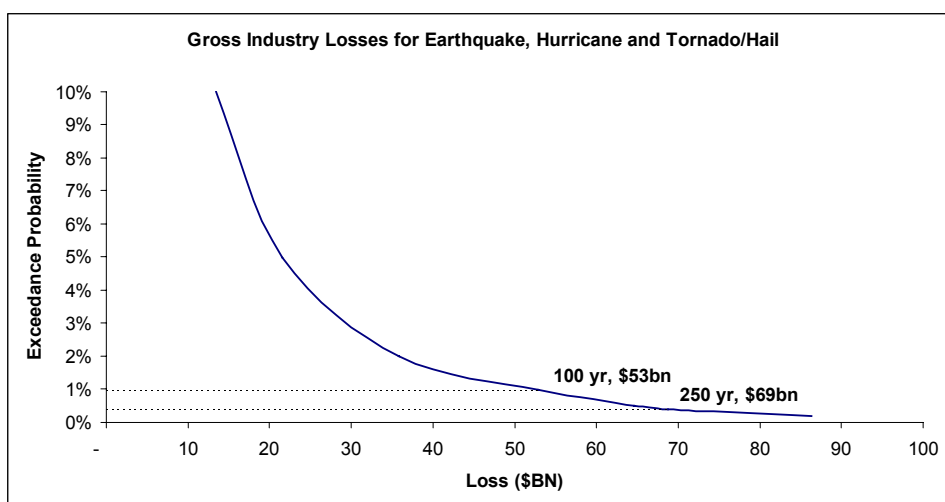


Figure 1. RMS modeled U.S. P&C industry exceedance probability loss distribution for natural hazard risk

While the industry has been preparing for losses of this magnitude, the WTC catastrophe raises several issues that challenge pre-existing measures of probable maximum loss:

- What is the suite of events that should be considered in an assessment of catastrophe risk?
- Does the Industry truly understand the extent of its urban accumulations of property exposure?
- Has the Industry adequately modeled the possibility of an accumulation of property, casualty, and liability losses that may result from the same event?

¹ In the U.S., this standard has been institutionalized via the A.M. Best catastrophe liability questionnaire, used by the rating agency as part of their evaluation process.

CATASTROPHIC RISKS ARE BROADER THAN NATURAL HAZARDS

For good reason, the industry has focused its catastrophe management activities on natural hazards. Since 1970, 38 of the top 40 most costly CAT losses have resulted from natural hazards. Since 1989, global insurers and reinsurers have suffered multi-billion dollar losses from no fewer than 20 earthquakes, windstorms, tornadoes, hailstorms, winter-storms, fires, and floods. Moreover, there is a credible body of data and science that suggest that future events of greater magnitude than those that have recently occurred are not only likely, but also inevitable. RMS models suggest that the global P&C industry can expect an average of \$20 billion in natural catastrophe losses per year, including the possibility for single event losses in excess of \$100 billion.

However, as a man-made catastrophe, the WTC attack suggests that the industry now broaden its view beyond natural hazards. Even prior to the September 11 terrorist attacks, man-made events such as industrial accidents, aviation losses, riots, fire, and explosion have contributed 20% of the total CAT losses over the past five years. In addition, some of the worst man-made disasters such as the Exxon Valdez, Bhopal, and Chernobyl could have cost the industry billions if they had occurred under slightly different circumstances. Even events on the margin of our contemporary history warrant a second look, such as the Great Chicago Fire of 1871, which prior to September 11 seemed irrelevant to today's circumstances.

Incorporating terrorist attacks and other man-made super-CATs into an overall understanding of catastrophe risk is a difficult proposition. Setting aside the task of estimating probabilities, the 'footprints' of loss are disparate and, unlike natural hazards, difficult to constrain. Some events, such as the WTC attack or the September 21, 2001 AZF fertilizer plant explosion in Toulouse, France², are 'vertical' in nature with geographically distinct and highly concentrated damage patterns. Other events, such as biological or chemical hazards (accidental or otherwise), or IT-network disruptions (e.g. computer viruses), are 'horizontal' in nature, with more diffuse, often geographically discontinuous, impacts. Despite these challenges, it is prudent and possible to develop a suite of catastrophe scenarios, or 'stress tests', which can be modeled to develop a range of outcomes to supplement more rigorous and probabilistic assessments of natural hazard risks.

Figure 2 provides a generalized comparison of the concentration of loss ratios for varying types of catastrophes. By overlaying various scenarios against urban concentrations of exposure, loss estimates can be developed.

² 200-300 tons of ammonium nitrate exploded in a fertilizer plant in Toulouse, France, destroying the facility and damaging property several miles away, causing between FF10-15 billion (\$1.3-2 billion) in insured loss.

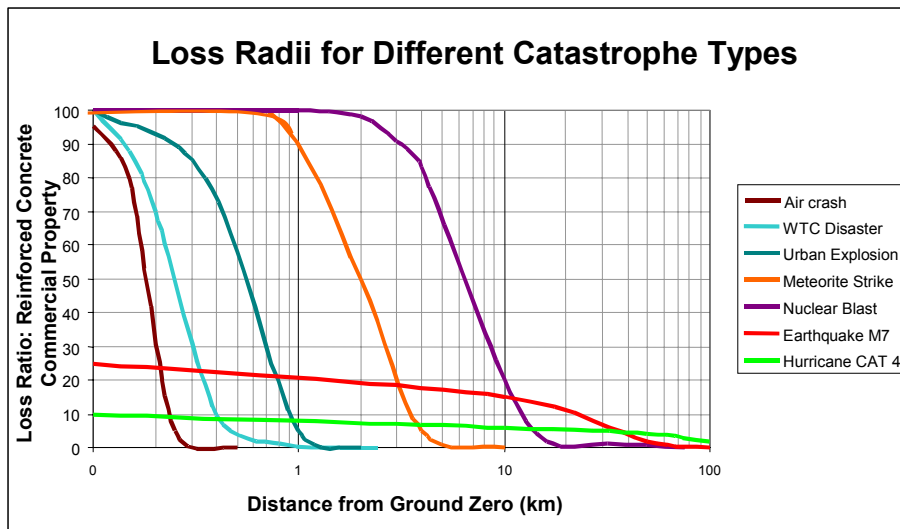
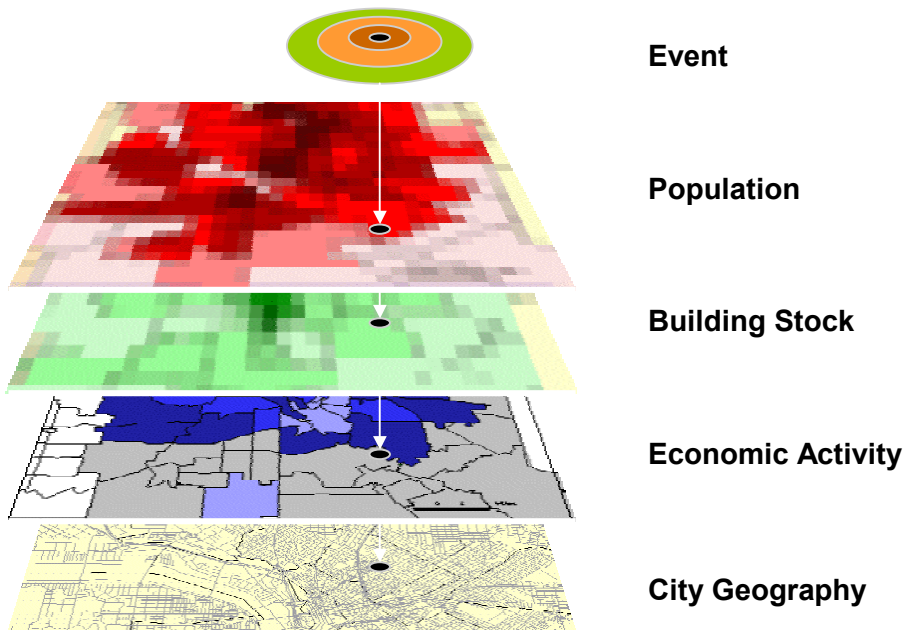


Figure 2. Loss footprint analysis: Loss estimates can be developed by overlaying various scenarios against urban concentrations of exposure

More specifically, scenarios can be developed for a variety of hypothetical terrorist attacks. Figure 3 depicts three sample attack scenarios, and the likely loss footprints.

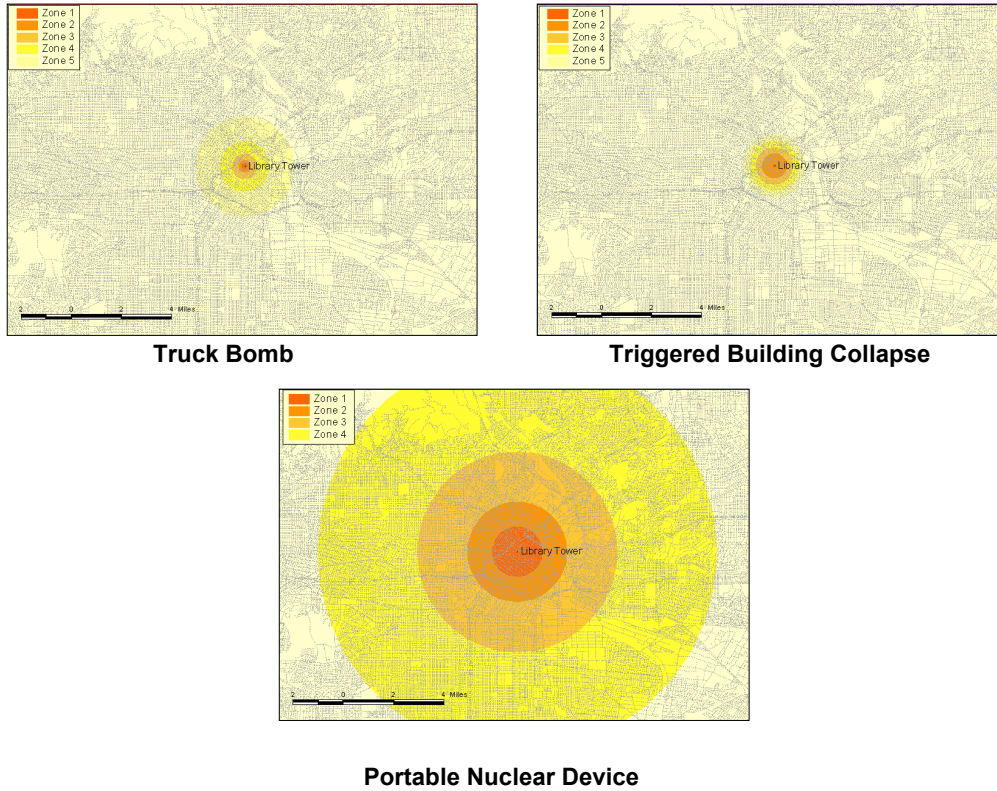


Figure 3. Hypothetical attack loss footprints

Regardless of the plausibility of a specific scenario, the fact is that the industry's view of its PML prior to September 11 is now a lower bound estimate. In addition to natural hazards, there exist a class of man-made events, some intentional – such as terrorist attacks – and some accidental, which can result in loss rivaling or even exceeding those that occur in major earthquakes and hurricanes. Going forward, a comprehensive understanding of risk must account for these possibilities.

URBAN CONCENTRATIONS SLIP UNDER THE RADAR

The foundation of any risk assessment is a proper understanding of exposure (i.e., garbage-in, garbage-out) and the concentration of this exposure with regard to various hazards. A decade ago, even a natural catastrophe-exposed portfolio might simply be described by crude aggregate measures which often-masked risky concentrations or unanticipated correlations within otherwise broadly defined zones. Motivated by the loss experience of the past decade of natural catastrophes, insurers have improved the quality of their exposure data, and used catastrophe models to avoid undue risk concentrations in peak natural hazard accumulation zones such as California, Southern Florida, and Tokyo. In addition, the potential for cross-regional clash, such as the possibility for correlated hurricane losses in both the Caribbean and the U.S., or windstorm losses across multiple European countries, is now explicitly modeled and managed.

Unfortunately, the collapse of the twin-towers is surfacing a larger than expected gap in many commercial insurers understanding of the extent and concentration of their property exposures in dense urban environments. Many insurers, by focusing their exposure management activities on a scale commensurate with the regional footprint of a natural hazard, have failed to fully grasp the density of their exposures in environments like lower Manhattan. As shown in Figure 4 below, RMS estimates that there is almost \$50 billion in insured commercial property value³ within a 1,000-meter (3,300 foot) radius of a hypothetical 'ground-zero' in lower Manhattan. Other major U.S. cities have comparable densities of insured value.

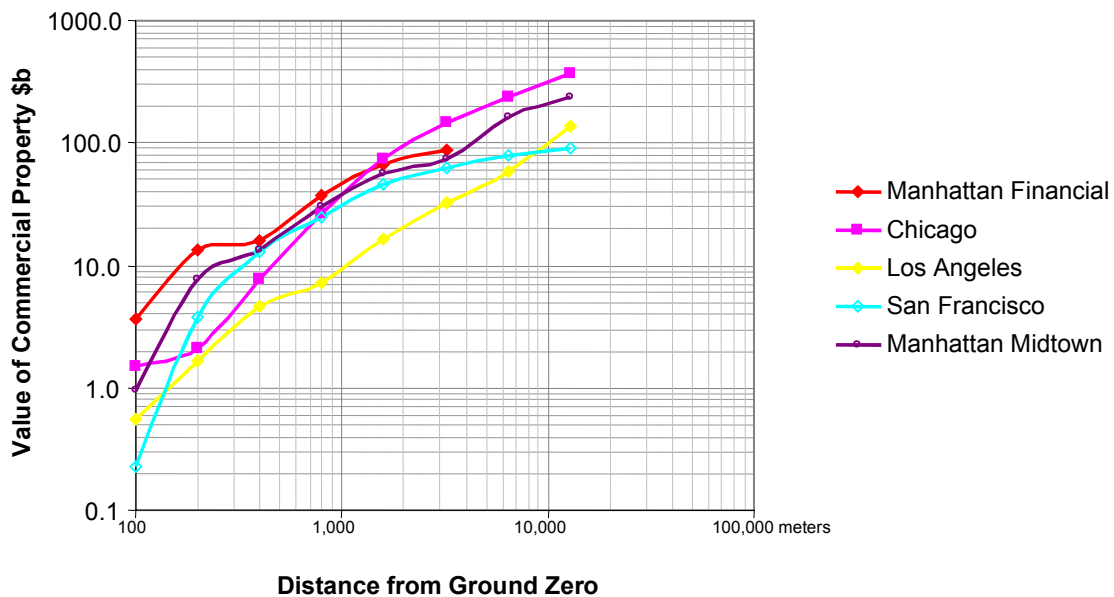


Figure 4. Concentration of industry exposure in U.S. urban centers

³ Excludes business interruption exposure

The complexity of a modern urban 'matrix' and the challenge of defining insured values for a portfolio of highly customized risks – often with a predominance of business interruption exposure - brokered and underwritten through multiple channels on a global scale is daunting. Problems with incomplete data, missing values, and systematic under-insurance, particularly on BI covers, are now surfacing as claims are reported from exposures that were not even on the radar screen prior to the WTC event. It is likely that the industry has under-estimated its exposures in and around the WTC by as much as 40%. What are the real total insured values across multiple insureds within a single large commercial structure or complex, between adjacent or 'across the street' buildings, or in and around just a few city blocks?

Given the complexity of its commercial exposures and the lack of natural hazard driven attention to exposure management, lower Manhattan may not be representative on a national level, but the event sends a wake-up call: exposures in cities across the country are greater than currently understood.

PROPERTY, CASUALTY, AND LIABILITY RISK IS HIGHLY CORRELATED IN EXTREME EVENTS

For years, modelers and industry analysts have hypothesized that, in addition to property claims, a major earthquake would cause significant liability, workers compensation, and life insurance losses. In 1995 RMS published its three-part 'Big One' series, which modeled overall industry losses from catastrophic earthquakes in Los Angeles, San Francisco, and Tokyo. For example, in "What if the 1906 Earthquake Strikes Again – a San Francisco Bay Area Scenario," RMS estimated that a repeat of the 1906 event would cause 3,000-8,000 deaths and 8,000-18,000 serious injuries, and that non-property claims would be significant⁴.

There were modest casualty and liability claims in the 1989 Loma Prieta Earthquake and the 1994 Northridge Earthquake⁵. However, the fact that the industry, prior to September 11, had not experienced a significant clash of property and non-property claims in the same catastrophe made the possibility of such losses seem somewhat abstract. While some insurers and reinsurers have factored (on an ad-hoc basis) for the addition of non-property and other 'non-modeled' catastrophe (losses) to their risk assessments, most have not attempted to explicitly quantify or manage for this possibility.

The WTC attack clearly demonstrates that catastrophe risk is not solely a function of the 'traditional' exposures of property, contents and equipment, and business interruption. RMS estimates that approximately 50% of the total claims resulting from the event will be related to casualty, liability, and life insurance exposures⁶. Figure 5 on the following page provides an estimate of the breakdown of the expected claims, by type of exposure.

⁴ For a copy of this 1995 report, contact RMS at www.rms.com

⁵ Approximately 5% of the total insured losses.

⁶ World Trade Center Special CAT Bulletin, September 18, 2001 (www.rms.com)

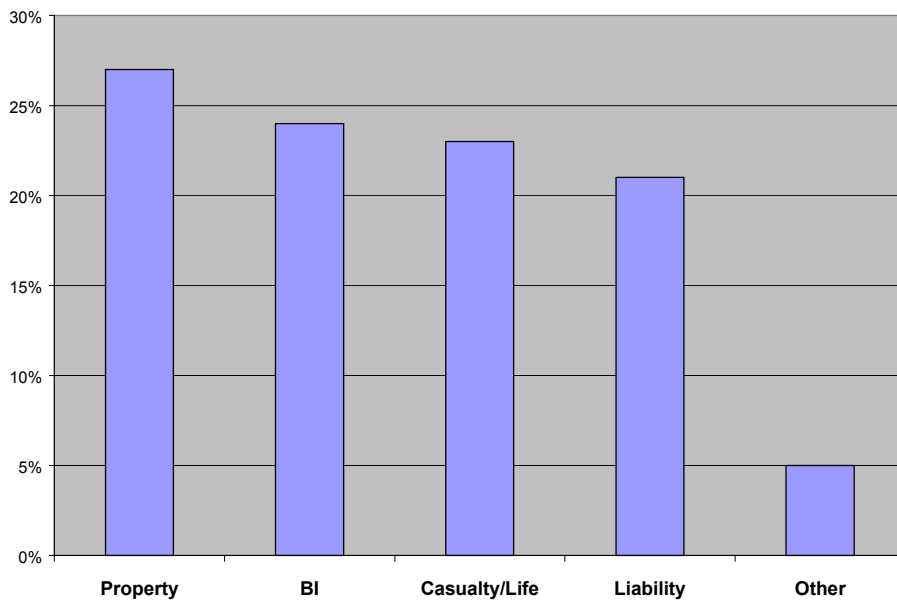


Figure 5. Estimated breakdown of WTC losses by category

The distribution of these losses serves to illuminate that the commercial properties that the industry insures also pose a consequential risk to those who work (and live) in and proximate to these facilities. As shown in Figure 6, there is a positive correlation between concentrations of workers compensation and commercial property concentrations. While modern building codes are explicitly optimized for life-safety considerations, catastrophic and sudden destruction of structures are possible in earthquakes, terrorist attacks, fire conflagrations, and industrial accidents⁷. In such circumstances, property damages are correlated to casualty risks, which in turn are correlated to liability exposures.

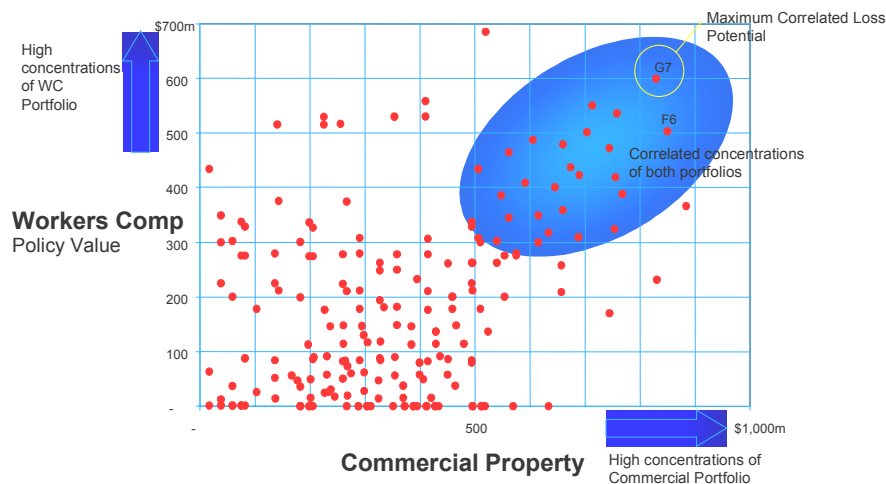


Figure 6. Correlation of workers comp and property exposure concentrations

⁷ For example, the Toulouse fertilizer plant explosion noted earlier injured approximately 1,500 in addition to over FF10-15 billion (\$1.3-2 billion) in property loss.

Going forward, the industry needs to explicitly consider the catastrophic and spatially related correlation of risk across various lines of business. A complete view of risk will require an adequate understanding of all the different threads of insurance and loss potential in a modern and sophisticated urban environment. Clearly, this will be a challenge. Many of these lines are managed within independent silos, and there is often little visibility across the enterprise as to where undue multi-line accumulations may exist. Compounding the challenge is that most non-property lines are not underwritten or priced based upon the specific location or construction characteristics of the buildings that envelope the human exposures. A 'comp' account may be written only knowing the payroll, the State, and the SIC code (occupancy) of the insured. Monitoring and modeling the intersection between this level of data and geographically distinct catastrophic hazards and highly specific structures will not be easy. However, given the materiality of the potential losses, and their catastrophic correlation with what may already be significant property exposures, the stakes should warrant the necessary investments in business process, systems, and risk analytics.

MODELING CLAIMS PAYING CAPACITY

While the significant majority of insurers and reinsurers will be able to meet their WTC obligations, the event is providing a rare opportunity to understand the dynamics of a catastrophic event and the ability of insurers and reinsurers to tap their expected claims paying capacity. Modeling claims paying capacity is an important dimension of an enterprise risk assessment. Companies must be not only able to meet their obligations after a catastrophe, but also be able to remain viable, avoid the downward spiral that often comes from impairment and rating downgrades, and remain able to pay losses from subsequent events. Lessons learned will prove invaluable as the industry raises the bar and looks ahead to the eventuality of an even larger catastrophe.

Like all aspects of risk, capacity is not a fixed quantity, but is related to the characteristics of the loss-making event. In a catastrophe, natural or otherwise, both the amount and timing of payouts play a role in determining the severity of the consequences. Furthermore, if the event is significant enough, it may adversely impact the asset values of insurer's or reinsurer's investment portfolios, amplifying the event's impact on the balance sheet. At some level of loss, reinsurance recoverables may also be at risk.

TIMING OF PAYOUTS

Any evaluation of the impact of a super-CAT on an insurer or reinsurer's claims paying ability needs to consider the cash flow of the likely payouts and reinsurance recoverables. A \$50 billion industry event with immediate payouts will have a different impact and will require a different approach to risk and capital management than one where the claims are made over a decade. Prior to September 11, the collective experience of the industry was that catastrophes (natural catastrophes) had a short claims development period. The significant majority of the losses in Andrew and Northridge, for example, were driven by property claims, mostly from personal-lines covers. As such (notwithstanding the fact that some Northridge claims remain in dispute seven years after the event) most of the demand on insurers' claims paying capacity occurred within several months of the occurrence of the event.

As of November 9, 2001, 11,383 WTC-related commercial claims and 7,476 personal claims were submitted, at a value of \$8.4 billion⁸. The journey from this value to an ultimate payout of as much as \$52 billion will be a long one. Figure 7 depicts the possible timing of payouts, as compared to the Northridge earthquake. The timing of payouts will be slower as approximately 50% of the likely \$52 billion in claims will be from non-property exposures, such as liability and workers compensation lines (as shown above in Figure 5). Furthermore, the property losses are highly complex and will include a preponderance of business interruption claims. Although billions of dollars will be paid shortly, the majority of complex property, liability, and casualty claims may take years to fully settle. If the casualties had included a greater portion of injuries rather than fatalities, then the development period would have been even longer.

⁸ Source: Disaster Insurance Information Office

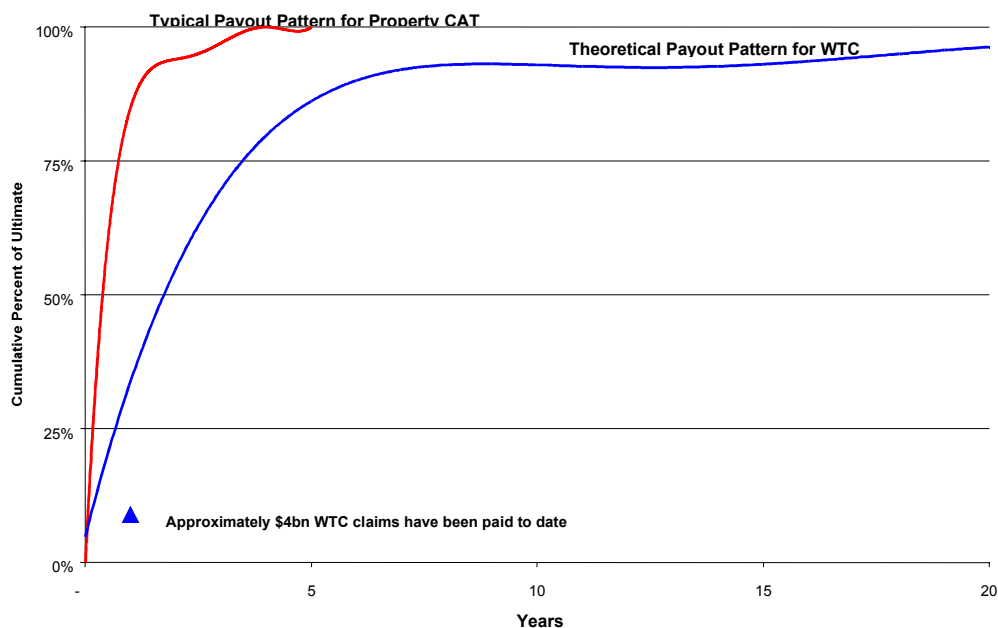


Figure 7. Payout pattern of typical property catastrophe vs. WTC disaster

CORRELATION BETWEEN CATASTROPHE LOSSES AND ASSET VALUES

The statutory surplus of the U.S. insurance industry, supported by the values of insurers' stock and bond portfolios, was \$298.2 billion as of June 30, 2001. However, a major concern – the extent of which is in part dependant on the liquidity demands dictated by the timing of expected payouts - has been whether the market value of insurers' assets would fall in the aftermath of a catastrophe. Will insurers and reinsurers receive full value for their assets if they must rapidly cash-out large positions of stocks, bonds, or infrequently traded investments (i.e. private placements or real estate) into a market which may already be reeling from the overall consequences of the super-CAT, potentially forcing ever lower values? In other words, what is the *fire sale* value of the industry's capital? Liquidity demands are particularly burdensome for primary insurers, who must pay out claims before receiving reimbursement from reinsurers. Their need for liquidity may be greater than their net losses.

In general, due to emphasis on fixed income securities over equities, the insurance industry's capital is fairly liquid. Over the past 30 years, the percentage of common stock holdings has ranged from a high of 29.0% in 1972 to a low of 12.5% in 1990. A study of portfolio asset mixes over the 1988 to 1995 period reveal that bond investment levels shifted very little, ranging from about 54% to 56% of admitted assets⁹. Today, it appears that ample sources of liquidity exist to settle the claims from the WTC event. Reporting their third quarter financial results in mid-October, most insurance company executives reiterated that they do not expect a need to liquidate a significant portion of their

⁹ A study by Henebry and Diamond in 1998. These percentages are very similar to those found by Robert A. Rennie in a 1977 study that covered the 1952 – 1975 timeframe.

long-term investment holdings. They expect to be able to meet claims obligations out of operating cash flow, maturing short-term investments, and other sources of liquidity such as bank credit facilities¹⁰.

Liquidity notwithstanding, the possibility that catastrophe losses and asset values are positively correlated has long been the subject of speculation and numerous studies have tried to assess the relationship between catastrophes and the stock market. Intuitively, it might be expected that an event that causes extreme insured losses could also cause disruption in the capital markets. How significant is the risk of correlation between catastrophic claims and the market value of insurers' assets?

Research around the catastrophe linked securities (CLS) market advanced the theory that there is little correlation between the capital markets and catastrophe losses, providing the basis for the argument that securities with returns indexed to catastrophe risk should be un-correlated with movements in the capital markets. Analysis of historical events has not shown any significant statistical correlation between natural catastrophes and persistent changes in the financial markets. Previous studies such as Canter et al. (1996) and the CBOT (1995) have reported that catastrophe loss experience is un-correlated with changes in the financial markets. A more recent study examined the relation between quarterly catastrophe loss experience from 1970 to 1995 with the experience of the stock and bond markets for that period¹¹. The results of the study showed a 90% confidence that the correlation between the PCS Index and the S&P 500 is effectively zero.

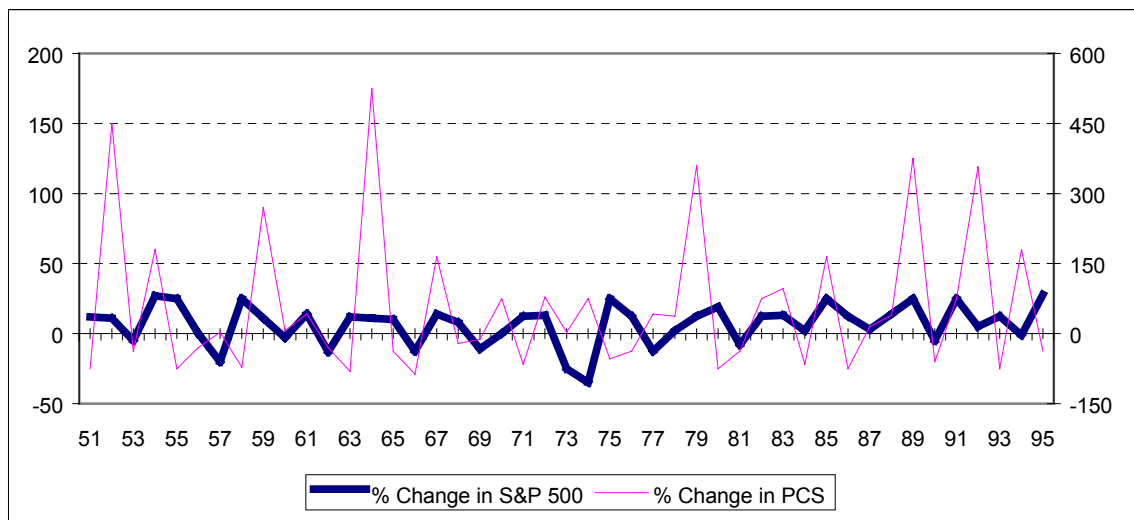


Figure 8. Relationship between U.S. industry CAT loss (PCS Index) and S&P 500¹²

¹⁰ The downside of tapping these credit facilities is that many maintain restrictive covenants requiring certain debt-to-equity ratios and surplus levels, both of which could be negatively impacted by the event.

¹¹ "Correlation of Catastrophe Losses to the Stock and Bond Market," Hoyt/McCullough, 1999.

¹² "Insurance Derivatives: A new asset class for the capital markets and a new hedging tool for the insurance industry," Canter, Cole, and Sandor. *Journal of Derivatives* (Winter 1996, pp 89-104).

BUT WHAT IF THE INSURED CATASTROPHE IS ALSO A GEO-POLITICAL CRISIS?

Before taking too much comfort in the historical lack of correlation, it is important to consider the absence of a super-CAT of the scale of the WTC attack in the historical record, particularly one impacting an economy already teetering on the edge of recession.¹³ In addition, these studies focused on natural catastrophes. September 11, unlike an earthquake or a hurricane, was not only a catastrophic insurance loss, but also a geo-political crisis. For example, during times of military action by the U.S. the equity markets quickly dropped and stayed down for a period of time – essentially until victory or some other means of resolving the uncertainty of the period had been resolved. In the five months following the December 7, 1941 Japanese attack on Pearl Harbor, the S&P declined by 17%. On August 2, 1990 – the day Iraq invaded Kuwait, which ultimately led to the Gulf War – the S&P 500 embarked on a three-month decline of 13.5%. While not a military event, the first OPEC oil crisis triggered a fall in the S&P 500 by 40% over 1973 and 1974.

While the performance of the capital markets in relation to either a natural catastrophe, a recession, or even a time of war has been well documented, there has been scant research conducted on an event that encompasses the characteristics of each of the three scenarios simultaneously. There is no doubt that the attack on the U.S. puts added stress on an economy already struggling through its first sustained slowdown in a decade. Many economists believe the impact on consumer confidence and specific industries will push the U.S. into a recession for the first time since the early 1990s. Not surprisingly, when the stock market reopened on September 17, stock prices fell sharply (the S&P 500, for example, fell 4.92%). However, during the ensuing weeks, the markets quickly recovered. In fact, as shown in Figure 9 below, the S&P 500 is now trading at a level *above* the time of the event.

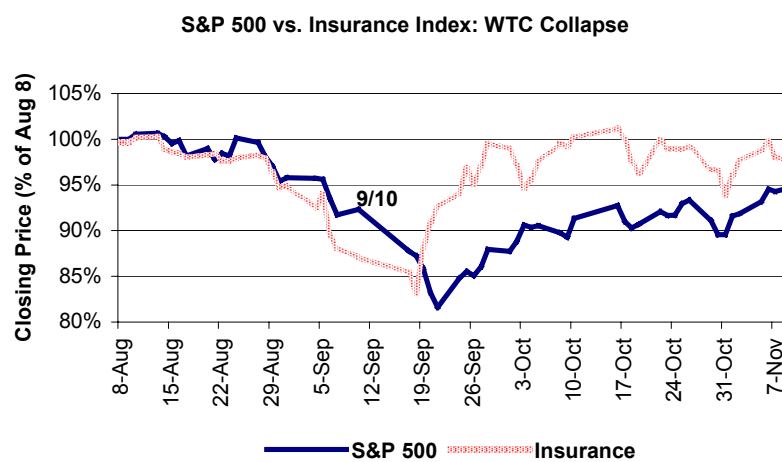


Figure 9. Performance of S&P 500 in relation to the WTC attack

¹³ Retrocession confirmed to have begun in March 2001, per a government panel on November 27, 2001.

DON'T FORGET THE BOND MARKET

While the asset allocation of insurers and reinsurers can vary significantly between companies¹⁴, the bulk of insurers' investment portfolios are not in equities, but in the bond market. While the Federal Reserve and other central banks have cut interest rates to boost struggling global economies, credit spreads have widened considerably since September 11. Investment-grade spreads initially widened by 34 basis points (bps) (from 217 to 251 bps) over 10-year U.S. treasury issues, and remained at comparable levels through the end of October. Spreads on speculative-grade notes, which constitute 3% of insurers overall fixed income investments, initially widened by 59 bps (from 992 to 1051 bps) and then widened another 150 bps to reach 1,200 bps by the end of October. In addition to reducing the market value of insurers bond portfolios, a net increase in spreads (over rate reductions) serves to increase the carrying costs of insurers' debt. Intermediate (3-5 year) A-rated bond spreads widened by an average of 20 bps, and 'long' A-rated bonds widened by 54 bps.

LOOKING FORWARD

Prior to September 11, the capital markets have not historically had a sustained reaction to catastrophic losses. And, despite the unprecedented magnitude and characteristics of the WTC event, it appears that any correlated reductions in the market value of insurers' stocks and bonds are unlikely to materially impact their ability to meet immediate claims obligations. However, it may be premature to be confident of the relationships between insurance claims and changes in asset values. The capital markets did move in response to the WTC event, and it is important to maintain the perspective that the insured losses, even at \$50 billion, could be dwarfed in a future natural or man-made catastrophe. The losses in this event are 'only' equivalent to the 100-year return period U.S. industry natural hazard loss. What might the financial market response be to an even larger catastrophe, such as a repeat of the great 1906 San Francisco M8.3 earthquake, particularly if it had devastated Silicon Valley at the peak of the technology economy?

RISK TO REINSURANCE RECOVERABLES

Reinsurance – or in the case of reinsurers, retrocessional reinsurance - is an important source of claims paying capacity for insurers and reinsurers alike. Globally, approximately \$70 billion in catastrophe excess-of-loss reinsurance limits are purchased each year. Additional capacity is secured through a variety of facultative, per-risk, and proportional reinsurance programs. In a reinsurance transaction, the ceding company transfers some level of underwriting risk (e.g. catastrophe risk), and in return takes on some (hopefully smaller) level of credit risk associated with the ability of the counter party to meet its obligations. Obviously, companies with high ratios of reinsurance recoverables to equity will be at higher risk than companies with a lower level of recoverables. Reliance on substantial amounts of reinsurance is, in effect, simply another form of leverage (debt to equity).

Many insurers and reinsurers are currently reporting estimates of net loss that reflect the expectation of significant reinsurance recoverables. In mid-November, the insurance and reinsurance groups reporting the highest net losses were expecting to recover an average 50% of their gross losses from their reinsurers. Shortly following the event, an analysis by Credit Suisse First Boston examined

¹⁴ Some insurers such as Berkshire Hathaway have more equity and thus are more sensitive to equity market movements

the ratio of WTC reinsurance recoverables to the insurers' tangible equity. While the average ratio for the 32 companies analyzed was 55%, one third of the companies have recoverables greater than their tangible equity.¹⁵ Clearly, the consequences of slow payment, or default, could materially impact the claims paying capacity of some insurers.

THE WTC IS A REINSURERS' CATASTROPHE

Since September 11 there has been considerable focus on the risk to reinsurance receivables and the credit quality of the related markets. The prevailing assumption seems to be that some reinsurers will be unable to pay, owing to either the magnitude of their losses or a lack of liquidity. Not only are the gross losses far in excess of any prior catastrophe, the demographics of loss is concentrated in the global reinsurance market. In a 'typical' natural catastrophe, most of the gross losses are retained by the personal-lines segment of the industry (e.g. State Farm). In Hurricane Andrew and the Northridge Earthquake, large personal-lines insurers accounted for approximately two-thirds of the overall industry loss. Proportionally, these insurers tend to purchase less reinsurance than their commercial-lines colleagues. As a result, less than 35% of the overall gross insured losses in Andrew and Northridge were paid by reinsurers.

This will not be the case in this catastrophe. The aviation accounts, and the policies written on the structures and occupants of the World Trade Center complex, the World Financial Center, and other Grade A office towers in the area were supported by extensive amounts of facultative and per-risk reinsurance. Furthermore, the commercial insurers who wrote these accounts also carry significant catastrophe reinsurance treaties. A Lehman Brothers research note published on October 17 estimated that reinsurers would pay 58% of the losses, with the balance split between P&C (35%) and Life (7%) insurers. Some observers have suggested that as much as 70% of the overall loss could end up on the balance sheets of reinsurers. To put this in perspective, the magnitude of the reinsurance payout in this event will be comparable to what would occur in a natural catastrophe with gross losses twice that of the current WTC estimates, such as an \$80-100 billion earthquake or hurricane.

¹⁵ Accordingly, an A.M. Best statistic from the late 90's indicated that reinsurance recoverable represented nearly 65% of policyholders surplus.

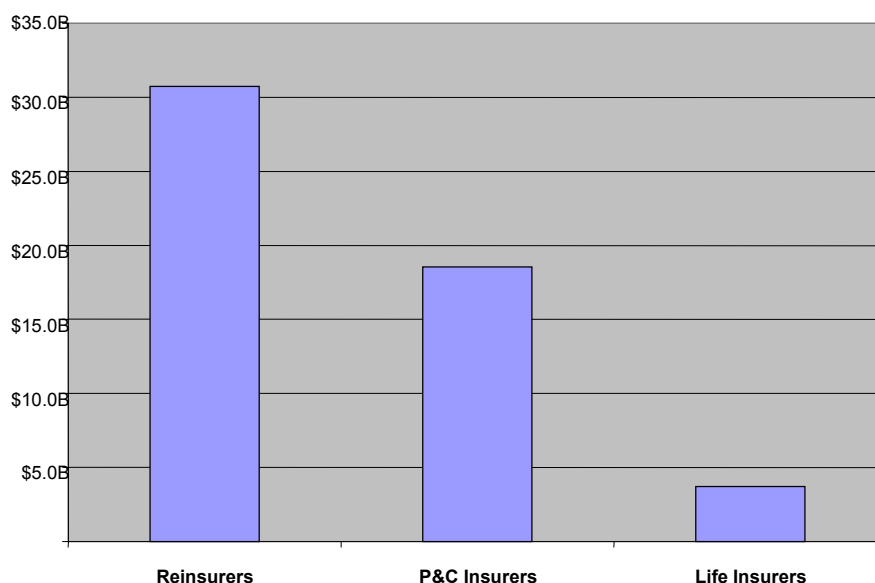


Figure 10. Reinsurers will pay the majority of WTC claims

ARE RECOVERABLES AT RISK?

That reinsurance market losses will be truly catastrophic is a fact. However, are the losses so great that insurance and reinsurance recoverables are at risk? What level of market loss is likely to trigger counter-party credit concerns?

The mere insinuation of a recovery issue conjures up memories of the London Market Excess-of-Loss (LMX) spiral of the late 1980s.¹⁶ In general, the credit risk of the reinsurance market as a whole has decreased over the last 10-15 years as the industry largely consolidated into a few dozen well-capitalized players who have become increasingly sophisticated in their use of catastrophe modeling and other techniques to manage their risks. However, the Unicover¹⁷ debacle of the late 1990s suggests that some reinsurers continue to take on unanticipated exposures, and in some cases, may find it difficult to meet the resulting obligations.

Recognizing the criticality of the recoverable issue, rating agencies and reinsurance markets were quick to weigh-in. Although the majority of companies already downgraded by A.M. Best are reinsurers, many analysts initially stated that they do not expect that “any of the interactively-rated leading insurers or reinsurers face solvency-threatening levels”¹⁸ and that “there would be no issues with reinsurance recoverable collectability.”¹⁹ At the October 3-5 Bermuda Angle Conference, the

¹⁶ It is estimated that up to 3,000 reinsurers worldwide were affected by the LMX spiral, which was created when reinsurers reinsured each other, often at different levels, transferring risk between themselves rather than dispersing it, and as a result, increased the volume of transactions dramatically. This situation was exacerbated by the poor market conditions.

¹⁷ Until Unicover imploded, worker’s compensation carve-out pools came in two flavors; those that had an appetite to retain a significant portion of the risk, and those that did not. The latter included the Unicover pools. It was these heavily retroceded pools, which offered reinsurance attaching as low as \$10,000 at astoundingly low rates, retained as little risk as the law allowed and retroceded at similarly astounding rates, that caused the problem.

¹⁸ Standard & Poor’s, September 25, 2001

¹⁹ Bank of America Securities, September 28, 2001

management of several of the largest Bermuda reinsurance companies²⁰ acknowledged that they had substantial reinsurance recoverables, however none were overly concerned about collectability. They emphasized that they believe their reinsurers would pay up and that the financial strength of “their reinsurance carriers” remains solid. While admitting that recovery may not be a problem, however, they were concerned that coverage disputes are likely.

Unfortunately, since these early assessments, the estimated size of the market loss has increased substantially. In late September, most observers estimated a market loss of approximately \$25 billion. Two months later, following a series of upward adjustments by insurers and reinsurers, many expect losses to approach \$50 billion, and some estimate losses as high as \$70 billion. While it is unlikely that many material bankruptcies will occur as a *direct* result of the WTC loss, the slow-payment of reinsurance recoverables as insurers and reinsurers sort out their losses or in some cases, dispute claims, will have an impact. Delay of reinsurance payments may result in a serious liquidity squeeze for some smaller insurers, and particularly for some of the Lloyd’s syndicates (see discussion of Lloyd’s below). Even under the best of circumstances, there is often a significant degree of negotiation between primary insurers and reinsurers over exactly how to allocate losses from complex covers. Given the incredible complexity and scope of the WTC ultimate losses, it is probable that there will be disagreements between primary insurers, reinsurers, and retrocessionaires that could take years to settle. At the end of the day, it will be the primary insurers (and their credit profiles) who are most hurt by reinsurance disputes. Primary insurers may find themselves in a position of having to pay out gross losses in the short-term, while waiting to resolve disputes with their reinsurers before receiving payments.

A CLOSER LOOK AT LLOYD’S

Many primary insurers are reporting ‘net of reinsurance’ losses on the expectation of significant recoverables from the Lloyd’s reinsurance market. Lloyd’s tends to specialize in many of the complex lines effected by the WTC event, not only on a per-risk and excess of loss reinsurance basis, but on a direct basis as well, and as such, will be responsible for a large share of the loss. Since the event, Lloyd’s has stated that liquidity is not a problem and that it is supported by reinsurance recoverables, at least 90% of which are rated A or higher. However, as of November 22, 2001 Lloyd’s was reporting a net loss of approximately £1.9 billion (\$2.7 billion) based upon its current gross loss estimate of £5.7 billion. In its own right, a \$2+ billion loss will place significant stress on the Lloyd’s market if some proportion of syndicates’ reinsurance protection is unrecoverable. Lloyd’s issued its initial loss estimate on September 27, 2001 – by November the net estimate had increased by 46% and the gross estimate by 6%.

The WTC loss is likely to impact approximately 90% of syndicates. The advantage that all of the syndicates have – and indeed the Central Fund as well – is that a great deal of time is likely to elapse before primary claims are paid and all of the reinsurance and retrocessions are unraveled. This slow process does not help the solvency of any particular loss year, but it does assist the liquidity of the members and their ability (willingness) to commit capital to the future. Lloyd’s announced on October 25, 2001 that it had reached agreement with the National Association of Insurance Commissioners (NAIC) on the level of funding required for its “Credit for Reinsurance” trust funds.

²⁰ The 10th Annual Bermuda Angle Conference held on October 3-5, 2001 had the following participants; ACE, IPCR, MXRE MM, PRE, RNR, TWK and XL.

By November 15, 2001 Lloyd's had deposited funds equaling 60% of the gross liabilities arising from the WTC attacks. The balance, to bring the funds up to 100% of the reinsurance liabilities, will be paid by the end of March 31, 2002.

Furthermore, much of the loss will fall into the hands of corporate capital vehicles owned by large international insurance companies (e.g. Ace, XL Capital, and St Paul). However, a few of the smaller syndicates that have limited capacity may become insolvent. It will be the loss in excess of the assets of these syndicates plus any losses from syndicates that are already insolvent (e.g. HHH) that will hit the Central Fund. The Central Fund held £323 million (\$469 million) on December 31, 2000, is insured for another £350 million (\$508 million) in excess of £100 million (\$145 million) deductible in any one calendar year, and is subject to an overall aggregate limit of £500 million (\$725 million) for the duration of the five-year policy that inceptioned on January 1, 1999. In addition, Lloyd's has the right to call £336 million (\$488 million)²¹ more from member syndicates. The re/insurance layer for this fund is placed with Swiss Re, Employers Re, St Paul, Hanover Re, XL Capital, and Chubb.

Standard & Poor's has reiterated that considerable uncertainty remains over the size of Lloyd's loss and that further deterioration would be in line with the overall industry loss. S&P has placed Lloyd's on a watch list with negative implications, due in part to liquidity concerns, and the cumulative impact of other losses this year such as the Petrobras (rig P-36) loss²², the Sri Lankan airlines loss, and the November 13, 2001 crash of an American Airlines flight in Queens, New York. While S&P has maintained their "Negative Outlook" for Lloyds, A.M. Best removed their "Under Review" status as of December 18, 2001.

MODELING REINSURANCE RECOVERABLES

The WTC catastrophe highlights the real possibility that some portion of reinsurance may not be recoverable following a super-CAT, and that a strong positive correlation exists between this form of credit risk and catastrophe risk. Managing this highly correlated risk by simply placing reinsurance with, for example, A-rated reinsurers is but a first step. Prior to the WTC event, some insurers have 'haircut' their likely recoverables, often between 5% and 20%, when modeling their claims paying capacity to account for the probability that in a super-CAT, they may be unable to recover their limits from all of their reinsurers. Going forward, it will be prudent to take such analyses to the next level of detail to better understand the relationships between the size of market loss, the demographics of the loss, and the consequential demands on the reinsurance landscape.

²¹ Conversions in December 2001 dollars.

²² The loss from the Petrobras P-36 deep-sea oil-rig on March 15, 2001 resulted in approximately \$500 million in insured loss, of which Lloyd's had the largest share (\$200 million).

ARE INSURERS PREPARED FOR THE ‘BIG ONE’?

It appears that most insurers and reinsurers will remain viable following the consequences of September 11. However, while the insured losses in this event are unprecedented, they do not constitute a probable upper bound. It is imperative that the industry learns from this event, looks ahead, and prepares for the inevitability of even greater losses. Is the industry truly prepared for the Big One?

Preparation must take place on several levels. First, insurers and reinsurers need to model and ‘stress test’ their portfolios to better understand the extent of their catastrophe risk from both natural hazards and man-made disasters. While insurers and reinsurers have begun to understand their property exposure to natural catastrophes in recent years, the events of September 11 serve as an unfortunate reminder that:

- Catastrophes are more than natural
- Insurers need to improve their collection of accurate and reliable exposure data, particularly for business interruption covers and for property concentrations in urban areas
- Potential losses in any event extend beyond property lines of business, and that these non-property exposures must be tracked and incorporated into overall risk assessments

Second, insurers and reinsurers should revisit the adequacy of their capital surplus in light of a more comprehensive assessment of risk and a proper consideration of the correlations between the claims paying capacity and the size of the catastrophic losses. Understanding solvency and liquidity requirements requires a more robust assessment of the timing of potential payments under varying catastrophe loss demographics, the possibility for a reduction in asset values following a major catastrophe, and the potential for problematic reinsurance recoverables. In 1999 and early 2000, studies by RMS, A.M. Best, and others have suggested that the U.S. P&C industry is over-capitalized by as much as 35%²³. These assessments need to be revisited, both at the industry level and for individual companies with the newfound appreciation that there is now a bit less capital to go around – offset in part by the formation of newly capitalized entities – and that prior estimates of both the frequency and severity of catastrophe risk, and the enterprise correlations, may be understated.

Third, and perhaps most fundamentally, insurers and reinsurers must improve their ability to earn an appropriate risk-adjusted return on their capital (RAROC)²⁴. Catastrophe risk not only needs to be quantified and managed to acceptable levels, but also needs to be adequately priced and hedged to reflect not only the expected losses, but also the capital needed (attributed) to support the volatility and correlation of the risk to the portfolio. Ultimately, it is this last challenge that will determine whether the industry is truly able to manage its risk.

²³ RMS, Oliver, Wyman and Company, and ERisk published a study showing the industry is overcapitalized by 20%-30% based on 1999 data. To view this study, go to www.pcraroc.com

²⁴ Go to www.pcraroc.com for more information on this methodology.

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