

# RISK MANAGEMENT IN PRACTICE

PartnerRe





“At PartnerRe we are in the business of assuming risk. Our success is determined by how well we understand, price and manage risk. While many industries and companies start with a return goal and then attempt to shed risks that may derail that goal, we start with a capital-based risk appetite and then look for risks that meet our return targets within that framework. We believe that this construct allows us to balance our cedants’ need for absolute certainty of claims payment with our shareholders’ need for an adequate return on their capital.

We are convinced each of the stakeholders in our industry would benefit from a more fulsome discussion of risk. Last year’s annual report gave an overview of how we think about and manage risk at PartnerRe. This year we describe in more detail components of our risk management framework and the policies and metrics that we have built around certain key categories of risk identified as posing the greatest threat to our economic value. By describing how we manage these risks, we hope that our cedants and shareholders will have a clearer understanding of the risk profile of PartnerRe and therefore can make a more informed assessment of our value proposition.”

*Patrick Thiele, President and CEO*

## Our Risk Management Framework

All organizations face a number of risks that threaten the successful execution of their mission. These include choice of strategy and markets, economic and business cycles, competition, changes in regulation, data quality and security, fraud, business interruption and management continuity, among others. Reinsurance companies also willingly assume the risks of other organizations as their prime value creating function. That is the core of our business.

At PartnerRe, our risk management framework encompasses the strategic risks that we share with the rest of our industry, assumed risks – the reinsurance and capital market risks that we are paid to assume – and the operational risks that are a part of running any business. We identify and categorize risks in terms of their source, their impact on the Company, and the preferred strategies for dealing with them. We take an integrated approach, because it is impossible to manage any of these risks in isolation. There are interrelationships and dependencies between the various categories of risk. Each must be viewed in the context of the whole if their potential impact on the organization is to be fully understood and effectively managed.

Our organizational structure and our risk management framework are inextricably linked. Our structure is designed with a significant emphasis on the effective and efficient management of the Company's risks. The Executive Management and the Board are responsible for managing strategic risks and setting key risk policies and limits. The individual business units manage our assumed risks, subject to the limits and policies established by the Executive Management and the Board. Operational risks are managed by designated functions within the organization. Controls and monitoring processes throughout the organization ensure that Management and the Board have a comprehensive view of the Company's risks and related mitigation strategies at all times.

### Strategic and Operational Risks

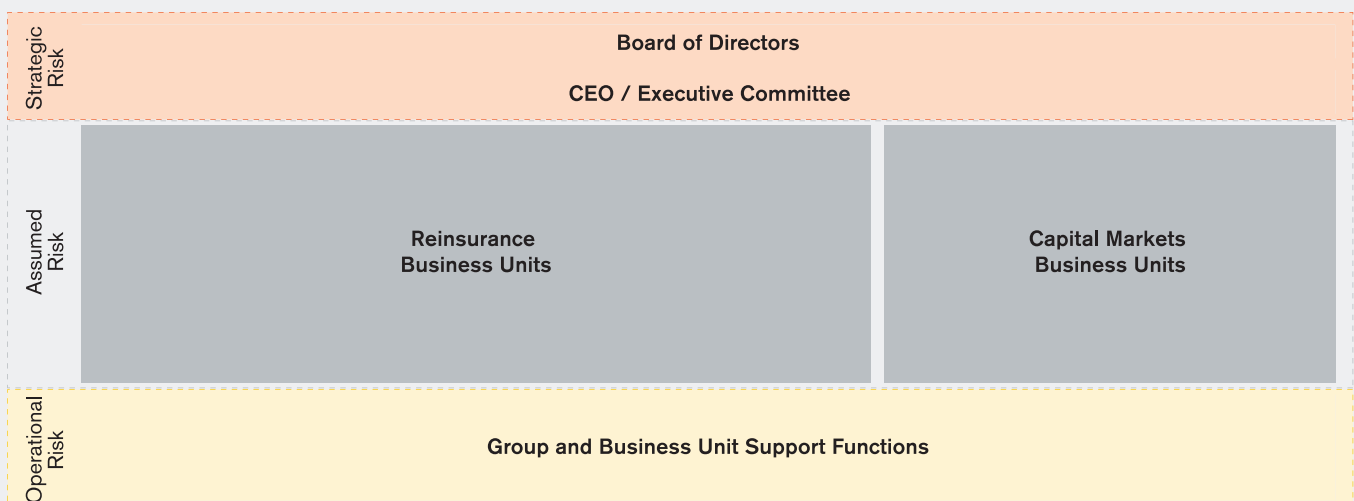
All businesses face strategic risks. Broad themes are generally the same across all industries, but the specific nature of the risks depends on the industry. We consider strategic risks to include the direction and governance of PartnerRe, as well as our response to key external factors faced by our industry. For example, our ability to remain competitive and achieve adequate returns could be impacted by changes in regulation, new competition, or the appeal of the reinsurance product as an efficient risk transfer mechanism for our clients. We believe that a cohesive group of talented

managers and directors, sound governance and prudent management enables us to mitigate our strategic risks, while ensuring that we are in the best position to take advantage of emerging trends and opportunities.

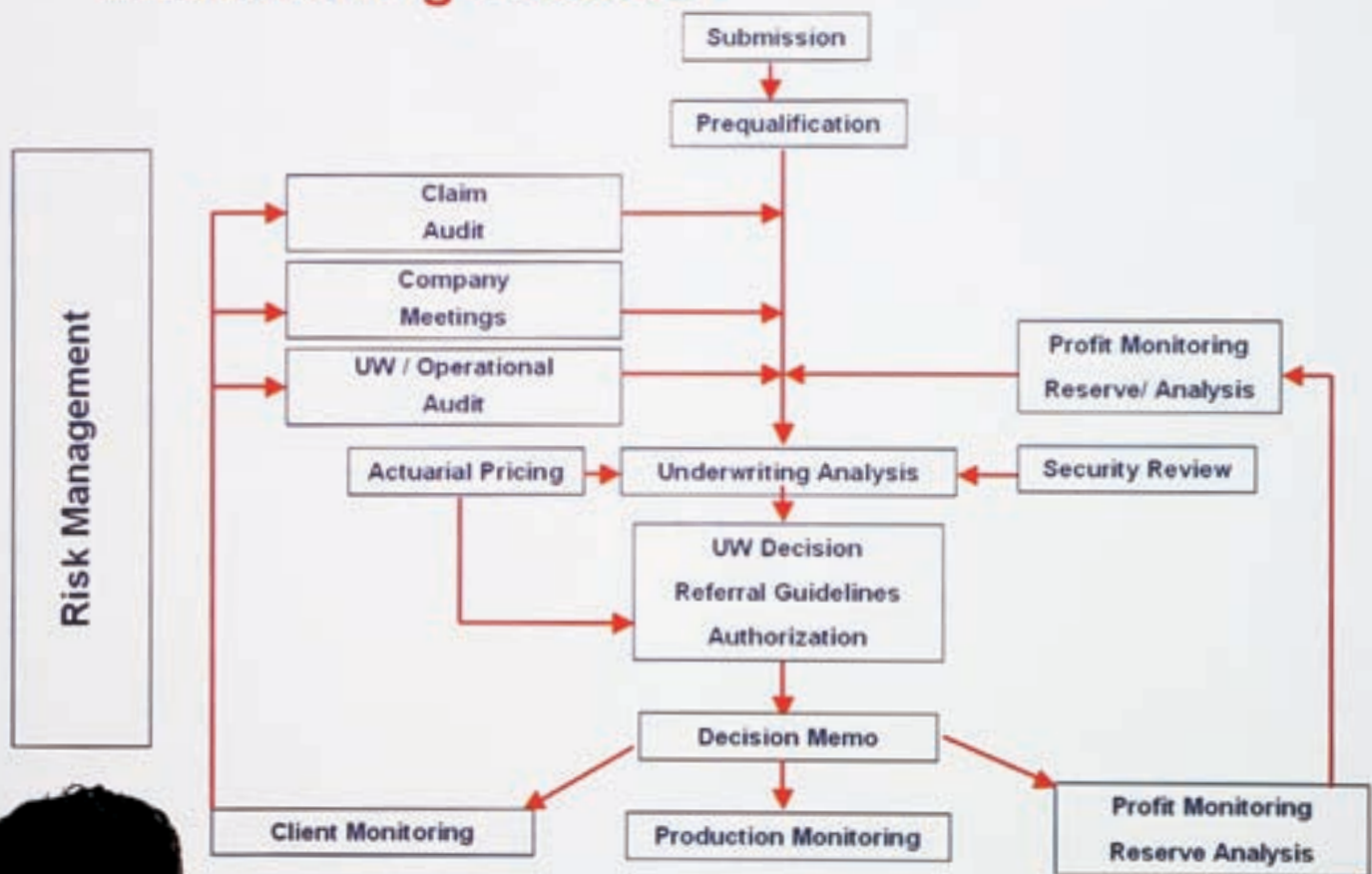
Operational risks are faced by all major complex organizations. They include failures or weaknesses in financial reporting and controls, non-compliance, poor cash management, fraud, breach of information technology security, reliance on third party vendors and foreign exchange risks. Operational risks only offer a downside to the organization; we don't get paid to take on these risks. We seek to minimize them as much as economically feasible through robust processes and controls throughout the organization.

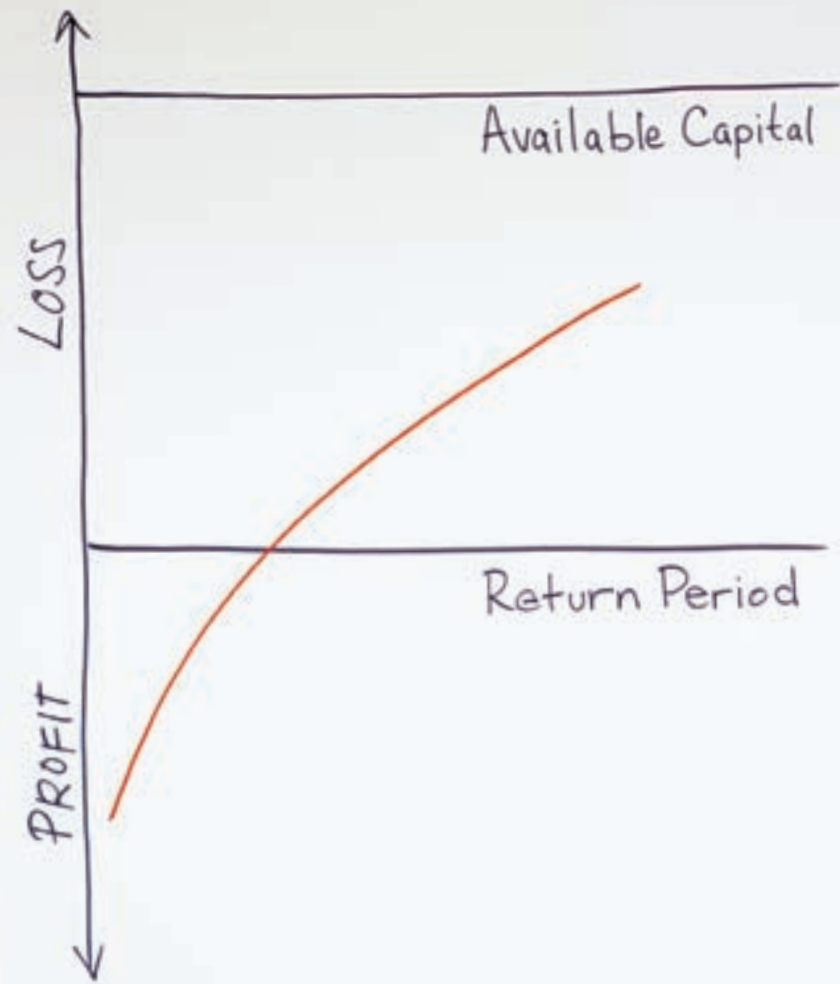
A complete description of our integrated risk management framework would cover all categories of risk and discuss our risk governance, processes and controls. However, in this report we wish to focus on our assumed risks, and in particular on the limits that we impose on those risks that we believe pose the greatest threat to the continuing success of a reinsurance company: catastrophes, casualty reserving, and equity risk.

### Illustration of PartnerRe Risk Types



# Underwriting Process





## Assumed Risks

Assumed risks are the risks that make our industry and company unique. We get paid to take on these risks. They are the reinsurance risks that our clients want to transfer and are the reason we are in business. They also include the capital market risks that we take in the investment of our portfolio.

We assume these risks because we believe we can earn an attractive return through our ability to evaluate and manage them. However, if we take on too much, or the wrong risks, they also represent a threat to the organization. At a strategic level, we manage these risks through diversification and absolute limits. At an operational level, risk mitigation strategies for assumed risks include strong processes, technical risk assessment, and collaboration among different groups of professionals who each contribute a particular area of expertise.

Our industry is predicated on the relationship between risk and opportunity: the higher the expected return, the higher the risk. The first thing a reinsurance company must do is decide where on that line it wishes to be. We have made the strategic decision to maintain a risk

appetite moderately above the average of the reinsurance market, because that position offers the best potential for creating shareholder value at an acceptable risk level. We believe clients will allow us to earn higher returns only if we are willing to absorb some of the risk and volatility that they do not want to retain. Therefore, the most profitable products generally present the most volatility and potential downside risk. We look to manage that risk through diversification, and absolute limits on any one risk.

We believe that diversification is a powerful risk mitigation tool that increases portfolio returns per unit of risk. Over the last several years, PartnerRe has created a portfolio well diversified across lines and markets.

In seeking to limit our assumed risks, we accept that our business and results on a quarterly basis will be somewhat volatile. However, we do want to protect the company from downside risk that can have a negative impact on our organization and materially impair our balance sheet. The limits we impose represent the boundaries of our risk tolerance and are based on how much we can lose of the capital that our shareholders entrust to us.

The major risks to our balance sheet will typically be due to events we refer to as “shock losses”. We define a shock loss as an event that has the potential to materially damage economic value (as defined below). There are three areas of risk that PartnerRe has identified at present as having the greatest potential for shock losses. These are catastrophe, reserving for casualty and other long-tail lines, and equity investment risk. Other risks can impact earnings substantially and could certainly lead to volatility in results, but by themselves are unlikely to represent a material downside threat to our economic value. Such risks would include mortality and longevity risk, interest rate risk and credit risk, as well as random volatility in underwriting results.

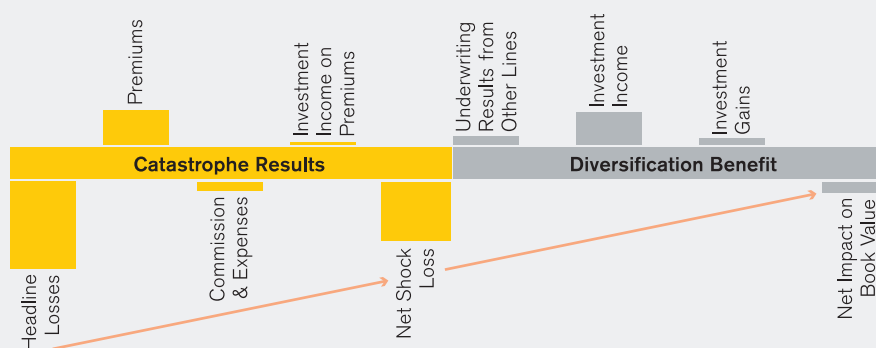
We manage the risk of shock losses by setting limits on our tolerance for specific risks and on the amount of capital that we are willing to expose. Our approach in the key areas of catastrophe, casualty reserving and equity investment risk is set out on the following pages.

## Interpreting our Limits

We establish limits to manage the absolute maximum foreseeable loss from any one event. For example, our catastrophe zonal limits principally do not represent probable maximum losses derived from catastrophe models or any other loss estimate calculated at a particular probability level. Our limits mostly represent the sum of all covers exposed to any catastrophe loss in the peril zone. Even extremely unlikely events may only partially impact the zonal aggregate exposed limits. For example, our hurricane Katrina loss at \$511 million was approximately 50% of our zonal aggregate exposed limits for US South Coast wind. (We think of Katrina as a 1-in-100 year Gulf of Mexico wind event and a 1-in-40 year US wind event.)

The impact of any single loss event – or even a series of events that constitute shock losses – on PartnerRe’s balance sheet is likely to be significantly less than the size of the headline loss. First, we receive premiums to cover the risk, which we invest until losses are paid.

Illustration of the Effect of Catastrophe Shock Losses on Book Value



We can use these premiums and investment income on those premiums to pay losses before using our capital. Second, we benefit from our diversified platform: the odds are that, in a year when we experience a shock loss from any of the three main risk sources, we will be able to absorb a significant portion of that loss through the positive contributions of the remainder of our operations, including other underwriting profits, investment income and capital gains, resulting in a significantly reduced impact on our book value.

## Economic Value

In setting limits for our shock losses, we are guided by the potential impact on PartnerRe’s economic value. We calculate our economic value as the difference between the net present value of our tangible assets and the net present value of our liabilities, using appropriate risk discount rates. For traded assets, our calculated net present values are equivalent to the market values.

# Limiting Shock Loss Risks: Catastrophe Risk

**Risk:** The risk that the aggregate losses to PartnerRe from natural perils materially exceed the net premiums that we receive to cover such risks.

**Measure:**

(i) Aggregate exposed limits for catastrophe losses in each of our defined exposure zones.

(ii) Aggregate modelled net economic losses (i.e. losses less net premiums received) at particular return periods as a specified percentage of available economic capital.

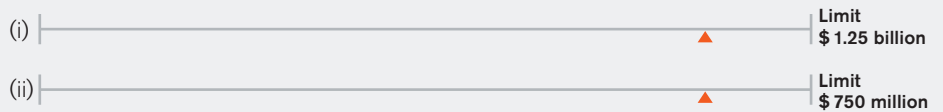
**Tolerance:**

(i) Total aggregate exposed limits in any one zone for a loss from any single peril to be less than \$ 1.25 billion.

(ii) Aggregate modelled net economic losses (i.e. losses less net premiums received) of multiple events for approximately a 1-in-75 year return period to be less than \$ 750 million (i.e. 60% of maximum zonal aggregate limit).

**Risk Management:** Real time allocation of catastrophe exposure capacity on each exposure zone to different Business Units. Regular modelling of aggregate loss scenarios through proprietary models. Combination of quantitative and qualitative analysis. Geographically diversified catastrophe exposures. (Catastrophe excess-of-loss risk not mitigated through retrocession.)

**Present Position (12.31.2005):**



At PartnerRe, we are concerned with both the loss of capital due to a single large event and the loss of capital that would occur from multiple (but perhaps smaller) events in any year.

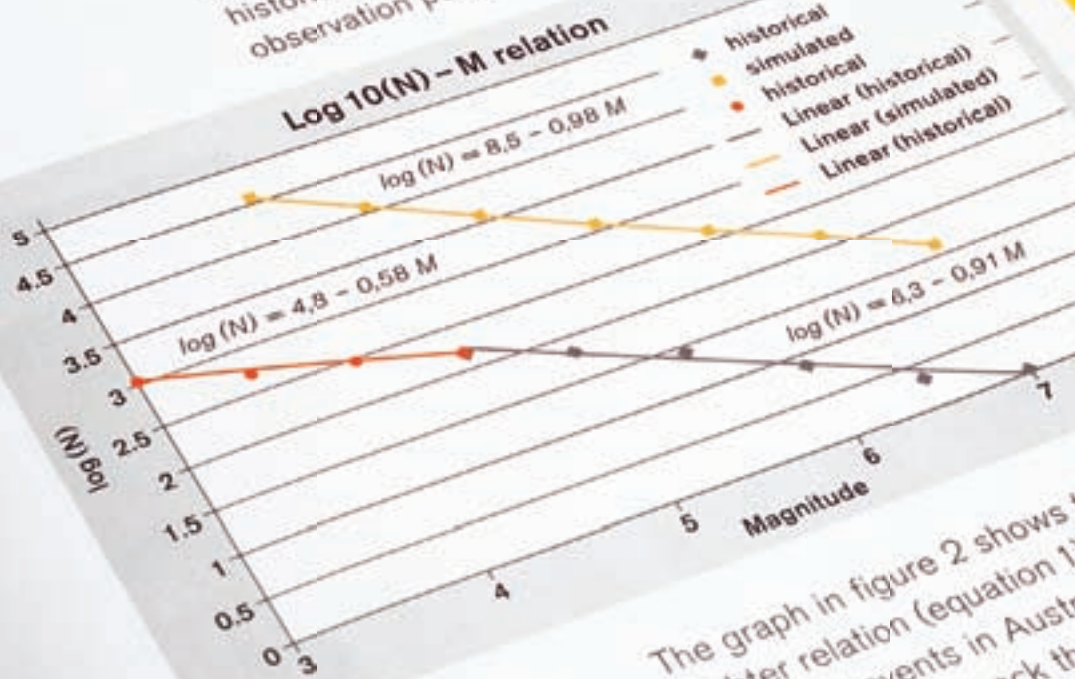
We impose an absolute limit to our catastrophe risk from any single loss through exposure limit caps in each zone and to each peril, with the largest zonal limit being no more than \$ 1.25 billion. This is equal to approximately a third of our total capital.

A zone is a geographic area in which the insurance risks are considered to be correlated to a single catastrophic event. Not all zones have the same limit. Our zones are broadly defined so that it would be highly unlikely for any single event to substantially erode the aggregate exposure limits from more than one zone. Even extremely high severity/low likelihood events will only partially exhaust the limits in any zone, as they are likely to only affect a part of the area covered by a wide zone. For example hurricane Katrina affected approximately 50% of the exposure cap in its zone.

We also manage our exposures so that the chance that an economic loss to PartnerRe from all catastrophe losses in any one year exceeds \$ 750 million is unlikely to happen in a lifetime – i.e. the probability is less than one in 75 years. To measure this probability, we use proprietary models that take into account not only our exposures in any zone but also the likely frequency and severity of catastrophic events. We supplement our quantitative analysis with the professional judgement of our experienced underwriters.

### Event Set Generation Example: Australia

Event set generation for Australia was based on the International Seismic Centre (ISC) historical Australian event catalog (95-year observation period).



**Figure 2:** Graph of the Gutenberg Richter  $\log(N) - M$  relation for historical and simulated events in Australia.

The graph in figure 2 shows the Gutenberg Richter relation (equation 1) for historical and simulated events in Australia. This relation can be used (1) to check the completeness of historical earthquake data, (2) to estimate actual number of events occurring within observation period if data is incomplete to assign earthquake magnitude events within the model.

The graph shows a low  $b$ -value at magnitude 4.5 (orange circle), most likely reflecting a detection threshold in the Gutenberg Richter relation. The number of events within a 10,000-year period is considering

The Gutenberg

Catalog (ISC) historical Australian event catalog (95-year observation period).  
earthquake magnitude (M) =  
large-scale

Rel

anta b  
ental  
analys  
Guten  
Univer  
earthquake m  
large-scale

$N$  = number of earthquakes  
the given time  
 $b$  = gradient  
 $M$  = earthquake

Equation 1

Real data b  
of small e  
data set  
logarith  
and  
is



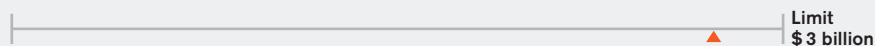
## Limiting Shock Loss Risks: Casualty Reserving Risk

**Risk:** The risk that the estimates of ultimate losses for casualty and other long-tail lines that underlie our booked reserves will prove to be too low, leading to substantial reserve strengthening.

**Measure:** Total premiums for casualty and long-tail lines.

**Tolerance:** Total earned premiums for casualty and other long-tail lines for the four most recent underwriting periods limited to no more than \$3 billion.

**Present Position (12.31.2005):**



Limit  
\$3 billion

One of the greatest risks in long-tail lines of business, and particularly in U.S. Casualty, is that the loss trends are higher than the assumptions underlying our ultimate loss estimates, and hence ultimate losses will be higher than our estimated loss reserves. This could happen for several reasons, but key among them is a pick up in general economic inflation (or in some cases sector inflation, such as medical care costs), regulatory or judicial intervention, social trends resulting in higher settlement awards to claimants and increased litigiousness leading to higher propensity to file and pursue claims.

When loss trends prove to be higher than those underlying our reserving assumptions, the risk is great because of a “stacking up” effect: for long-tail lines, we carry reserves to cover claims arising from several years of underwriting activity and these reserves are likely to be adversely affected by unfavorable loss trends. The effect is likely to be more pronounced for recent or “green” underwriting years because, with the passage of time, actual loss emergence and data provide greater confidence around the adequacy of ultimate liability estimates. For example, if our pricing actuaries misestimate loss trends by roughly four percentage points a year for several recent years, the effect could be an increase in the average combined ratio for those years of approximately eight percentage points. This would require a reserve strengthening of approximately 8% of cumulative premiums written in those years.

Accordingly, at PartnerRe it is our belief that the volume of long-tail business most exposed to these reserving uncertainties should be limited to a predetermined amount. Our limit for the aggregate trailing four-year earned premiums for specified long-tail lines in 2006 is \$3 billion.

**Risk Management:** Actuarial and reserving expertise, underwriting process, prudent and consistent reserving philosophy, cycle management, diversification within the casualty book, peer reviews and periodic external actuarial reviews.

Beyond the limits of our risk appetite captured in the volume caps, we manage and mitigate the reserve risk for long-tail lines in a variety of ways. First, we ensure that our underwriters and pricing actuaries follow a disciplined underwriting process that fully utilizes all available data and information, including industry trends. Second, we have prudent reserving policies for determining carried reserves. Our policies are systematic and are consistently applied over time. They are not affected by short-term results or earnings performance but have been designed to ensure balance sheet strength.

Finally, our underwriters will manage our exposures through the cycle within our risk tolerance boundaries, to optimize the risk/return trade-off over time. For example, during the soft phase of the U.S. Casualty pricing cycle from 1997 – 2001, U.S. Casualty risks represented 7% of our non-life premiums written, while during the harder phase of the cycle from 2002 – 2005 they comprised 16% of our premiums.

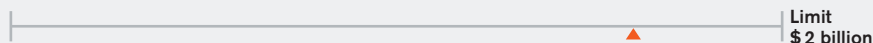
## Limiting Shock Loss Risks: Equity Investment Risk

**Risk:** The risk of a substantial decline in the value of our equity and equity-like investments during the year.

**Measure:** Equity and equity-like products as a percentage of available economic capital.

**Tolerance:** Investment in equity and equity-like assets to be no more than \$2 billion.

**Present Position (12.31.2005):**



**Risk Management:** Limits by asset type, class and ratings, limits by name and industry, diversification, investment expertise, governance, controls.

Assuming equity risk (and equity-like risks such as high yield bonds and convertibles) within that part of the investment portfolio that is not required to support liabilities provides valuable diversification from other risk classes, along with the potential for higher returns. However, an overweight position could lead to a large loss of capital and impair the balance sheet in the case of a market crash.

At PartnerRe, our equity (and equity-like) exposure is managed within strict guidelines, with a cap on assets other than investment grade bonds set at no more than \$2 billion, about half of our total capital. We have a diversified portfolio of such risks with strict limits

on investments in any one name and any one industry. This allows us to focus on the systemic effects of equity risks. Systemic risk is managed by asset allocation, subject to strict caps on other than investment-grade bonds as a percentage of capital.

PartnerRe applies equal care to all of its investment decisions. Strong governance and controls across the organization ensure that all investment decisions are made prudently, and that limits are not breached. A fully integrated information system provides real-time data on our investment portfolios, allowing for continuous monitoring and decision-support. An Asset Allocation Committee meets monthly to review and determine

portfolio duration, credit risk, allocation to equity and equity like asset classes, as well as new investment strategies or instruments. Each portfolio is managed against a pre-determined benchmark to ensure alignment with appropriate risk parameters and achievement of desired returns. Our investment operations follow state-of-the-art processes, including compliance with SEC, NYSE and AIMR regulations.



## Other Assumed Risks

Other loss events can impact economic value, but by themselves, over a whole year, would be unlikely to lead to a material reduction in our book value. These would include mortality and longevity risk, interest rate risk and credit risk, as well as some of the random volatility that we may experience in our diversifying lines such as specialty and automobile. We hold appropriate economic capital against these risks and manage within pre-established guidelines at the operational level.

## Systemic Risks

In addition to our assumed risks, we also face some interrelated risks that occur across our assumed risk portfolio, and not in just one particular business area. These systemic risks cannot be managed by diversification or by setting limits. The primary systemic risks we face are accumulated loss risk and cycle risk.

Accumulated loss risk is the risk that several shock losses occur at one time, for example a major catastrophe event accompanied by a collapse in the equity market. We believe that the limits we place on shock losses will allow us to survive the painful experience that risk accumulation may create for the reinsurance industry.

Cycle risk is the risk that some or all of the business cycles coincide. Soft markets across several different business areas at once would result not only in lack of opportunities but also greater exposure to risk. Our governance and strategy allow us to manage the cycle risk. If returns are below the level we consider adequate, we will reduce the amount of risk we assume and return capital to our shareholders.

We expose our capital to opportunities that will earn attractive returns. We do that by directing capital to those areas where the best returns can be achieved. We then write more business there and/or shrink those lines where our capital is in less demand and therefore provides a lower return. Our diversification gives us the flexibility to select the business mix that we feel optimizes returns, and this may change at any point during the underwriting cycle (or according to the investment environment).

## Conclusion

We believe that our chosen approach to risk management, and our limits, are appropriate for PartnerRe. Despite these risk management systems, we recognize that the world changes and occasionally confronts us with unexpected shocks. Perhaps our greatest risks are the ones we have not yet identified. We attempt to foster a sober and prudent attitude in the face of risk at PartnerRe, to ensure that we can successfully continue to meet the needs of our clients while creating value for our shareholders.





[www.partnerre.com](http://www.partnerre.com)