



# REINSURANCE NEWS

NEWSLETTER OF THE REINSURANCE SECTION

NUMBER 50

JUNE 2002

## THE FUTURE OF LIFE REINSURANCE

The following articles are based upon presentations given at the ACLI's Reinsurance Executive Roundtable held at Amelia Island, Florida, on February 20-22, 2002. The Reinsurance Section newsletter thanks David Atkinson, Jess Skriletz, and Chris Stroup for writing the following articles for this edition.

### The Future that Lies Ahead...

by Chris C. Stroup  
CEO of Swiss Re Life & Health, North America

*"Yesterday is not ours to recover, but tomorrow is ours to win or to lose."*

— President Lyndon B. Johnson  
address to the nation  
Nov. 28, 1963

**T**he future of life reinsurance in America is certainly ours to win or to lose. The forces of today—expanding technology, tightening capital, regulatory rumblings, mergers and acquisitions—will affect the focus of tomorrow. If we wish to win the day, one to prosper in a changing environment, we need to begin preparing ourselves now for the challenges that lie ahead.

What are those challenges? Any attempt to polish my crystal ball and peer into that future yields both positives and negatives, reasons to hope and reasons to tread carefully.

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### Ten Predictions for the Future...

by Jess A. Skriletz  
General Manager and CEO of ING Re

**W**e've all had days when we wished we could know the future. The business decisions facing us would be much easier if only we had a crystal ball. I can't give you a crystal ball, but I can offer a number of predictions and observations for the future of life reinsurance over the next five years. If you are like me, you take predictions with a healthy dose of skepticism. I hope to give you some things to think about that will shape your own opinion of the future of life reinsurance.

What do I see? A competitive market with a significant slowdown in growth coming from the rapid pace of growth seen recently, an increasing appreciation by life insurance companies of the financial strength of their partners,

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### Winners & Losers in a Converging Global Market

by David B. Atkinson  
Executive Vice President and COO of Reinsurance Group of America

**T**here is an old joke about the difference between American and Sicilian actuaries. While both groups can tell you how many people out of a thousand will die in the coming year, the Sicilians can tell you their names. In this article I am going to name company names. Be rest assured that I have no ties to La Cosa Nostra—I will not make any offers that you cannot refuse.

I'm going to confine my observations to the U.S. life mortality risk market. I'll take a look back in time, roll in some discussion of current conditions, and stick my neck out to try and predict the future.



David Atkinson

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## Chairperson's Corner Participation

by Jeffrey S. Katz

The issue I would like to bring to the Section's attention, in two different flavors, is an old refrain: participation. The SOA and its various component sub-groups, such as the Sections and Practice Areas, get the vast majority of their work accomplished through the efforts of member volunteers. Like any organization, we are only as good as we collectively choose to be through our own efforts. I urge each member to take at least a small share of responsibility for what we are as a section by volunteering. You could write a newsletter article, present at a section session or find a variety of other ways to contribute.

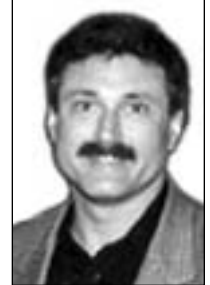
Our current volunteers are contributing in important ways. The Section Council members who have taken over the creation of interesting and informative sessions for the

various Society meetings have done a terrific job. I expect this year's meetings to have one of the best session lineups the Section has put together in the last several years. Another key Section activity is this newsletter, where over the past 18 months, the editorial reins have passed smoothly to a new editor.

Part of my concern is that I see the same members volunteering time and again to contribute to our activities. As Section Chair, I certainly appreciate the efforts of those individuals. But we need to get other members into the mix. There will come a time when the usual volunteers are not available, and we'll need others to step forward to shoulder the burden. Beyond that, the Section would benefit from the new ideas that others would contribute by providing new ways of seeing and doing

things that would bring needed refreshment to some of our routine activities. Finally, I have observed that those who volunteer today will lead tomorrow. We need to continually develop new leaders who can take us through the uncharted waters of the future.

So, don't delay! New classes are being formed *now!* Operators are standing by to take *your* call at 1-800 . . . or not. Still, if you want to participate but just don't know how to get started, give me a call or send me an e-mail. I assure you that all replies will be kept in strictest confidence and no salesman will call.



Jeff  
Katz

NUMBER 50

## REINSURANCE NEWS

NEWSLETTER OF THE REINSURANCE SECTION

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This newsletter is free to Section members. A subscription is \$15.00 for nonmembers. Current-year issues are available from the Publications Orders Department. Back issues of Section newsletters have been placed in the Society library, and are on the SOA Web site, [www.soa.org](http://www.soa.org). Photocopies of back issues may be requested for a nominal fee.

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## Correspondent Membership

One way to increase the odds of adding volunteers is to add new members. The Reinsurance Section is doing that through the creation of Correspondent Member status within the Section. Correspondent memberships are available to non-members of the Society who wish to participate in the activities of the Reinsurance Section. Dues for Correspondent Members are the same as for other Section members: \$10 per year at present.

Correspondent Members have access to Section activities just as other Section members do and also receive a subscription to the newsletter. It's a great way to participate in the Section without having to deal with those pesky exams!

The SOA Board of Governors approved Correspondent Member status as a change to the Section's by-laws earlier this year. Lois Chinnock of the SOA staff has developed an application form, a copy of which is included with this newsletter. The form is also available on the Section's page of the SOA Web site. Please spread the word to those in your organization who might be interested.

## Spring Meetings

As you are reading this, the Spring Meeting in Colorado Springs will be history and the San Francisco meeting will be just about to start. The

**"One way to increase the odds of adding volunteers is to add new members."**

featured Reinsurance session at both Spring Meetings is a mock trial. The topic is a timely one—the war exclusion. The product development/financial meeting at the end of May also offered a reinsurance session on a unified mortality approach. The health/pension meeting offers additional reinsurance sessions on provider excess stop-loss and trends in large claims. We are co-sponsoring these sessions with the Health Section. My thanks to Ronnie Klein, the Section Council member responsible for the Spring Meeting sessions, for all of his efforts in developing the sessions and recruiting presenters.

## Seminar

The Section sponsored an "Introduction to Life Reinsurance" seminar June 11-12 in suburban Chicago near O'Hare Airport. The seminar focused on the basics of life reinsurance including actuarial, legal, accounting and regulatory aspects. We offered the seminar in conjunction with the Product Development Actuary Symposium later that same week. Jim Dallas, the Section's vice-chairperson, organized the seminar. Presenters included Denis Loring, Tom Spurling, Craig Baldwin, Al Klein and myself. The seminar was approved for 10 units of Professional Development credit. In addition to actuaries, there were non-actuaries in attendance who wanted to learn more about reinsurance basics.

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## Editor's Corner

### The Special Edition that Never Was...

by Dean S. Abbott

**A**t the Reinsurance Hot Breakfast in New Orleans last October, Jeff Katz mentioned that within the months that followed we would be issuing a special edition newsletter covering the reinsurance impacts of the events of September 11. It was our intention to do so, and we had lined up authors for multiple articles on the topic. Unfortunately, only one of the promised articles

was ever written and submitted, therefore, the special edition newsletter never was. Hopefully, you haven't been scouring your in-basket wondering if you had misplaced it. The one article that was submitted, Jim Keller's article discussing the SPRA, has been included in this newsletter. If anyone is interested in writing an article for future newsletters discussing the impacts of

September 11, we would be very interested in hearing from you.



*Dean Abbott*

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## The Future that Lies Ahead

from page 1

### Reasons for optimism

Fortunately, the reasons for optimism are numerous. The U.S. life insurance marketplace seems headed for a secure tomorrow, and what's good news for life insurers is also good news for life reinsurers.

As the American people look forward to longer and healthier lifespans, they'll need to set aside more money for their retirement years. The current interest rates of traditional savings vehicles are low, which makes life insurance even more attractive.

In addition, the U.S. life insurance industry has special characteristics that keep it poised for success. As a whole, U.S. life insurers are remarkably adept at developing new products, and their mortality knowledge gives them a significant comparative advantage on a global scale. Product distribution remains an area with great potential that so far has not been fully exploited. Also not fully exploited is the U.S. insurers' investment in technology. Money has been spent, improvements have been made, but the hoped-for cost savings due to lower expense ratios are still somewhere in the future.

### On the downside...

Unfortunately, not everything is positive. There are challenges and obstacles on the U.S. insurance horizon that must be successfully navigated.

Chief among those obstacles are formidable new competitors created by the convergence of financial services industries in the United States. Mergers and acquisitions in this field have led to impos-

ing competitors with substantial resources. Merrill Lynch and Morgan Stanley are good examples.

Together, these two companies have greater market capitalization at their disposal than the top *eight* U.S. life insurance companies combined.

Needless to say, that gives Merrill Lynch and Morgan Stanley a considerable competitive advantage.

In addition, these new competitors have a keen understanding of consumer needs. And if the factors that now give insurers an advantage—the tax-deferral subsidy and estate tax laws—are ever eliminated or restructured, these new competitors will eagerly move into our marketplace.

State insurance regulations remain, of course, a constant cloud on the horizon. Regulations drive up administrative costs and increase capital requirements, making it more difficult for the insurance industry to compete with financial services giants that aren't hobbled by 50 sets of state regulation.

As these giants compete for our clients, they also fish in our talent pool. The supply of underwriters, actuaries, accountants and management professionals is not unlimited. With more companies vying for these talents, fewer capable people are available to fuel the insurance industry's progress.

### Fragmented roles and assets

Technology has contributed its own interesting wrinkle to the future of life insurance. With the Internet's ability to seamlessly

link computers and systems, companies across state lines and international boundaries, it's now

transparent to the consumer just who actually is providing the services he's receiving.

In the past, a single life insurer would have been responsible for managing investment assets, manufacturing products, distributing those products, providing customer service, taking on risk and administering its accounts. With technology, however, those roles have fragmented with life insurers often retaining only a portion of the responsibilities. Today, those functions fall to a variety of parties:

- **Managing investment assets**—handled by fund managers and insurers.
- **Manufacturing products**—still performed by life insurers.
- **Distributing products and providing customer service**—may be performed by a variety of credible, trusted advisors, such as banks, broker ages and independent financial planners, in addition to insurers.
- **Risk taking**—often handed off to reinsurers.
- **Administering accounts**—may be outsourced to professional third-party administrators.

This fragmentation of traditional life insurance roles has consequently led to a fragmentation of available assets, as well. In 1989, before this fragmentation began, life insurers had \$1.4 trillion in



assets under management. An equal amount was being managed by mutual funds, broker/dealers and market funds. This means the total available assets were split 50-50.

What a difference a decade makes. In 2000, with service fragmentation well underway, life insurers' assets under management rose to more than \$3.1 trillion. But the assets managed by mutual funds, broker/dealers and market funds leap-frogged ahead to \$7.7 trillion. It was no longer a 50-50 split. Instead, life insurers managed only 29 percent of those assets, with the remaining 71 percent going to other financial services companies.

As service fragmentation continues, life insurers are faced with managing a smaller portion of the available assets.

### Reinsurance opportunities

For reinsurers, this service fragmentation offers new opportunities in the United States. As more life insurers look to share their risk, more business is available for reinsurance companies. We can measure the growth by looking at cession rates, which is the percentage of new face amount that has been ceded to the reinsurance marketplace. In 1993, the cession rate was 15 percent. By 2000, that amount had more than quadrupled to 64 percent. When the numbers are in for 2001, they could top 70 percent.

Overall, the U.S. reinsurance market grew at a compounded rate of 29 percent, compared to a mere 5 percent for the primary insurance market. There are several reasons for this increase in reinsurance buying:

- Primary insurers are eager to avoid earnings volatility, and reinsurance is a key tool to accomplish that goal.

- The transformation of insurers to a fee-based business model has made it more attractive.
- Reinsurance rates are tempting.

The last point bears expansion. Over the past five years, life reinsurance prices have actually gone down, largely due to strict underwriting that produces lower mortality assumptions. Before leaving the subject of prices, it should be noted that the terrorist attack of September 11, 2001, has moderately affected the price of vanilla reinsurance for the group life market, where there is a built-in concentration of risk. September 11 has had the greatest effect on the price and availability of catastrophic coverage

**“September 11 has had the greatest effect on the price and availability of catastrophic coverage for both group and individual life insurance.”**

for both group and individual life insurance. This coverage is dramatically more expensive and difficult to obtain. Only time and future events will tell us if these markets will ever return to pre-September 11 conditions.

### Moderating the future

With falling reinsurance prices and rising cession rates, what does the future hold for U.S. life reinsurers? Are we on an unstoppable upward path? That would be nice, but it's unlikely. There is both good and bad news for life reinsurers:

1. Cession rates will level off. The 64 percent penetration rate of 2000 will likely hit a plateau at some point and will probably not top 75 percent.
2. An information advantage, an in-depth knowledge of underwriting and distribution effects on mortality will maintain the reinsurers' competitive edge.
3. New entrants into the life insurance business will be risk-averse, preferring to outsource their mortality risk-taking and underwriting.
4. As capital markets become more efficient and technology continues to make reinsurance arrangements transparent to the consumer, the cost of risk will eventually be driven downward to the level of commodity pricing.

### Commitment and capital

What will it take for a reinsurer to survive—and even thrive—in this new century? Two words that come to mind are commitment and capital.

Commitment will increasingly matter to primary carriers. They won't be satisfied with a reinsurance relationship that's merely the “flavor of the month.” Instead, they'll want to know they can count on a long-term business relationship with a highly rated reinsurer who has a demonstrated commitment to the life reinsurance business. This spells bad news for unaffiliated reinsurers and those with marginal operations.

Capital will also be a key issue because the supply of life reinsurance capital is bound to contract, perhaps as early as the third quarter of this year. The signs are already there; just look at the cost and capacity of current lines of credit that are used to manage the

## The Future that Lies Ahead

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strain of XXX surplus requirements. The result is that to survive and thrive, reinsurers must be able to offer impressive capacity.

In the U.S. reinsurance marketplace of tomorrow, primary carriers will want three things:

- Longer-term reinsurance relationships.
- A few trusted places to concentrate their business, thus maintaining that relationship.
- A reinsurer who can supply their capital needs, product development and underwriting capacity for the long haul.

In response, successful reinsurers must:

- Deliver a broad range of product offerings.
- Include non-traditional reinsurance options.
- Improve their credit ratings, because lower-rated companies just won't cut it in the future.

## Critical regulatory issues ahead

Two critical regulatory issues are looming on the horizon of the reinsurance world of tomorrow: the establishment of international accounting standards and the development of federal regulation of the reinsurance industry. While both proposals are likely a long way off, each would have significant long-

term effects on the industry. The wise will keep these developing projects in view.

Our U.S. statutory accounting system is under some pressure. First, non-admitted reinsurers are asking that U.S. collateral requirements be relaxed. In addition, at least one international organization is pushing for reinsurer white lists.

**"At the moment, regulation of insurance is the domain of the states, creating a 50-state maze of inconsistent rules and regulations that give insurers compliance headaches."**

Still, others are advocating international accounting standards. In the end, these standards may look much like current U.S. or Canadian Generally Accepted Accounting Principles.

No matter how the international accounting standards evolve, anything that produces a significant accounting change will surely have an equally significant effect on the demand for reinsurance.

The imposition of federal rules is the other moving regulatory target. At the

moment, regulation of insurance is the domain of the states, creating a 50-state maze of inconsistent rules and regulations that give insurers compliance headaches. But unless some compelling arguments are made for a single federal standard, the maze is likely to remain.

The most persuasive argument for a single federal standard would be to show how it would benefit consumers. But that's been difficult to argue because of the current perception that consumers can already get the products and prices they want, when and where they want them. Unless we can make a strong case for consumer benefit, federal regulators will be less motivated to seize control of the insurance industry.

But all is not lost for those who support federal regulation. Consumer arguments can be developed. The NAIC's inability to regulate consistently makes federal regulation more appealing to Congress. Gramm-Leach-Bliley is an example of what can be accomplished when the banks and insurers approach Congress together. In addition, the September 11, 2001, terrorist attack against the United States left Congress dismayed and frustrated when it realized it had no insurance expertise to call upon.

## Hounded by the headlines

The September 11 terrorist attack and the collapse of Enron have had an impact on almost every American industry. The reinsurance industry is no exception.

A government backstop for catastrophic claims, such as those stemming from the September 11 attack appears dead for now, although some recent comments from Alan Greenspan and a report from the General Accounting Office could breathe some life back into the proposal. So far, the industry failed to prove its case to the



federal government that reinsurance is unavailable for life products.

No one knows if Congress will act. But whether it does or doesn't, there are things the industry can and must do to better manage its risk. We need to learn from this experience, change how we do business and better manage risk concentrations. For this, we can look to the property-and-casualty industry and study the tools and behaviors they use to handle catastrophic claims, such as those from Hurricane Andrew in 1992. The industry developed methods to better identify risks and, when the risks were too concentrated, the industry worked to move those risks off their books.

The unprecedented collapse of Enron is another headline-grabber with reinsurance implications. Enron's covert deals and

labyrinthine bookkeeping have left investors and the public with a wariness of big business and a distrust of complicated accounting.

For the reinsurance world, this means clients will be looking for simpler, more understandable business transactions—something they can count on without unpleasant surprises somewhere down the road. They'll want reinsurance contracts that provide guaranteed payments for defined losses. Surplus relief, securitizations and other complex transactions are bound to fall under the magnifying glass of investigators looking for accounting sleight-of-hand.

### Preparing for tomorrow

Clearly, there are opportunities and perils awaiting us in the future of life reinsurance. Tomorrow will be ours to win or to lose, and the prize

will surely go to those companies who have prepared themselves to avoid the perils and seize the opportunities.

Theodore Roosevelt once advised, "Whenever you are asked if you can do a job, tell 'em, 'Certainly, I can!' Then get busy and find out how to do it."

Can reinsurers meet the challenges that lie ahead? Certainly, we can. We're already busy finding out how to do it today.

When tomorrow arrives, we'll be ready.

*Chris C. Stroup is chief executive officer of Swiss Re Life and Health, North America, and a member of the Life Executive Board of Swiss Re Life and Health. He is responsible for the life and health reinsurance business and activities for Swiss re in the U.S. and Canada.*

## Annual Meeting Reinsurance Section Council Meets

*Reinsurance Section Council members taking some time out of their meeting in New Orleans to pose for the SOA camera—*

*Back Row—Bob Beal (2000-2001 chairperson), Jim Keller, Bob Reale, Mel Young, Ronnie Klein, Jeff Katz (2001-2002 chairperson)*

*Front Row—Jack Bailey, Leigh Harrington, Jay Biehl, Jim Dallas, Dean Abbott (newsletter editor)*



## Ten Predictions for the...

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slowing consolidation of the leading life reinsurers and growth in the use of strategic alliances by life reinsurers.

Since our customers' needs shape the environment in which we'll operate, my predictions are based on the trends, issues and macroeconomic factors facing the life insurance industry. Although still strong and dynamic, life insurers have evolved over the last 20 years, increasingly emphasizing investment-oriented products over traditional protection-based ones. Life insurers' assets under management have grown rapidly through annuity sales and the acquisition of mutual fund businesses, while life insurance sales were relatively flat over that period. The industry also moved into variable products during the economic boom of the 1990's. These trends have increased the importance of fee-based income to life insurers. Additionally, the increasing proportion of life insurance reinsured may be a sign of life insurers striving for a more predictable bottom line and a growing aversion to earnings volatility.

The above industry trends are reflected in the top two concerns of life company management. Surveys have shown their two top concerns are achieving profitable growth and improving distribution efficiency and productivity.

Management's goal is to improve their company's profitability, and this is a tall order in a competitive market. Many life insurance companies are overcapitalized. While this situa-



tion is good for their financial strength ratings, it's poor for shareholder returns. Growth—organic or

through acquisition—can create scale and critical mass to improve shareholder returns. The strong trends of consolidation and demutualization are two indications of the underlying pressures life insurers are facing to improve profitability and to grow and reach economies of scale.

I also expect economic and demographic forces to continue to put pressure on life insurance company growth and profitability.

Competitive pressures, overcapacity and consolidation trends are therefore likely to result from these forces as well. I expect excess global industrial capacity to limit inflation, which should lead to relatively low interest rates over the next few years, as well as a lackluster equity market. Such an economic scenario will likely result in sluggish demand for fixed and variable investment products. Changes in tax policy may also reduce sales by life insurance companies, not only through changes in the estate tax, but also indirectly by increasing the

amounts that can be contributed to 401(k) plans. As the new \$20,000 annual 401(k) plan annual contribution phases in, there will

likely be a significantly reduced long-term demand for annuities. In addition, the Baby Boomers were

behind much of the growth in assets under management seen over the recent past. As this demographic



group eventually begins to shift from savings to payout as they retire, this major source of growth will disappear. It is also questionable if Generation X can provide the demand for insurance products to make up for the drop in demand caused by Baby Boomers moving into

retirement. First, the Baby Boomer generation is much larger than Generation X. Furthermore, Generation X'ers are believed by experts to be survivors, independent and "do-it-yourselfers." Therefore, people may be less likely to be interested in "bundled" insurance company investment products and more willing to invest directly in mutual funds or equities.

In summary, the life insurance industry is transforming into a broader financial services business with a focus on savings products. The playing field is not only crowded with insurers, but with the likes of Merrill Lynch, Charles Schwab and Fidelity. Insurers may have a long-term advantage (or disadvantage?) with their strong (but expensive) distribution channels, but the competition from these other players will continue to put pressure on profitability.

Demutualization and consolidation will continue as companies attempt to improve profitability, resulting in fewer and larger companies. Demographics have



recently helped life insurance companies grow their assets under management, but these trends are shifting. As a result, life companies will take increasingly stronger actions to improve shareholder returns. My predictions are:

**Prediction #1: Growth in recurring net amount at risk reinsured will slow to that of the growth of insurance sales within three years.** As the proportion of face amount reinsured continues to climb, it eventually must reach a limit. The rapid increase seen in the 1990s implies that reaching this limit will come more quickly than slowly. I expect that ultimately, no more than roughly 75% of the life insurance industry's net amount at risk will be reinsured. Many life insurance companies will continue to retain the bulk of their mortality risk and only reinsure risk in excess of their retention. The life insurers that decide to outsource their mortality risk will be required by reinsurers to retain significant risk in order to avoid moral hazard. What are some implications for life reinsurers? More competition, much slower growth and a growing emphasis on expenses and efficiency.

**Prediction #2: Competition for life reinsurance new business will remain strong, or even intensify, and industry profitability will disappoint shareholders.** We are in a very competitive market today, and offshore start-ups continue to put pressure on the market. With a predicted decline in the growth rate of new reinsured volume, competitive pressures will likely increase. Some observers have suggested single-digit rates of return should be expected on some recent acquisitions by life reinsurers. This is a sign of an environment in which I expect shareholders won't be very happy with returns. The result will

be a continued healthy tension between management and owners.

**Prediction #3: Profitable reinsurers will be those offering a compelling value proposition to clients. In a consolidating market, life insurers will outgrow the need for commodity reinsurance.** Most large insurers don't need to outsource their mortality, but they will when enticed to do so. A good price is one way to win business, but that doesn't necessarily solve the ceding company's problems. I expect risk management will take on a lesser role (although post September 11 it will remain important) with capital

**"The life insurers that decide to outsource their mortality risk will be required by reinsurers to retain significant risk in order to avoid moral hazard."**

and earnings arbitrage coming to play the major role as that addresses the primary profitability concerns of life insurers.

**Prediction #4: Financial strength and ratings will increasingly separate the strongest reinsurers from the rest of the pack.** Consolidation in the life insurance industry is creating ever-larger life insurance companies. These companies will demand bigger and stronger counterparties. Along with financial strength and rating, they will also look for a strong commitment to the market. Size and financial strength

are two signs of this commitment that leading reinsurers will use to grow market share.

**Prediction #5: Consolidation within the life reinsurance industry will continue, but at a slower pace.** If my prior prediction about market growth and size and strength is true, then many of the smaller reinsurers may be acquired, and that trend may even accelerate, presenting some smaller companies the chance to consolidate to become one of the top ten. Thus, I'm limiting this prediction to the top five to ten players only. I believe that client diversification needs will ensure opportunities for many in the industry and that consolidators will eventually reach a point where additional acquisitions will not add incremental market share above a level around 20%. As there are a number of reinsurers closing in on that limit, the top five to ten players are a more stable group than was historically the case. This prediction may prove wrong if the industry falls out of favor and if acquisition prices fall to the point that they don't need substantial new business to justify the price paid. Then we may see many acquisitions being completed as blocks of in-force business, rather than as going concerns.

**Prediction #6: Securitization of mortality or longevity risk will not occur to a significant degree.** Reinsurers need not worry about competition from the capital markets. Why? First, life insurance companies don't need a public market when they already have a competitive, efficient private market for transferring risk to highly rated life reinsurers. Second, any true transfer of risk would require a very complex structure and quite a fair amount of uncertainty over a long period of time. Such transactions are expensive to

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complete, and have very limited market potential given the educational hurdles with potential buyers are substantial.

I also do not believe there are many natural buyers of long-term longevity risk (other than life reinsurers). Pension funds to the typical long-term investor, are already exposed to longevity risk in their pension plans. That makes them a natural buyer of mortality risk (if old age mortality rates improve, they win on the securitization, which can help make up losses in their pension plans).

Given a pension plans' ability to invest in equities, perhaps they could best hedge their longevity risk by buying stock in life reinsurers, rather than entering into complex structures they don't have the expertise to underwrite.

**Prediction #7: Life reinsurers will increasingly and materially participate in strategic alliances and generate substantial opportunities with alternative distribution channels.** When your current customers aren't growing your business, you find new customers. Life reinsurers have the expertise to develop, underwrite and manage protection products. They just need the distribution. Both liberalizing financial services legislation and the "new economy" present opportunities for non-insurers to enter the life insurance marketplace. Life reinsurers, with their strong expertise and ability to assume risk, may be their ideal partners. What are the implications? Such strategic alliances will be a source of stability and growth for life reinsurers if insurers lose business to other

financial service providers such as banks, mutual funds and dot-com distributors.

**Prediction #8: The reinsurer that enables life insurance companies to successfully market payout annuities that provide balanced fund returns with guarantees against outliving savings will have a competitive edge for a month—unless they're reckless or crazy, in which case the competitive edge will last two months.** One of the biggest opportunities I see for insurers is to capture IRA and 401(k) rollovers as the Baby Boomer generation reaches retirement age. However,



the life insurance industry doesn't yet have a product that both protects the individual against outliving their assets and provides an attractive "balanced fund" level of long-term return. As life reinsurers were instrumental in helping annuity writers provide aggressive Guaranteed Minimum Death Benefits (GMDB), they also could play a role developing longevity guarantees on balanced funds.

I'm being just a little sarcastic by saying that whoever solves this dilemma has a month's head start. But news travels fast in this business. With reinsurers going into, then out of, the GMDB reinsurance business, I also wonder if there are companies out there that would follow a competitor into such a

business line before having the time to do a full risk evaluation.

**Prediction #9: The real competition between life reinsurers will be recognized as one for top talent.** Life reinsurance is a business that requires strong expertise to succeed. One of my biggest challenges has been finding strong and experienced talent. There isn't enough is out there, especially given the growth the life reinsurance industry has seen over the last ten years. While you can develop the staff you need, you must also strive diligently to retain them.

**Prediction #10: The fond memories of Bermuda will be real, but getting rich from an IPO or acquisition are only dreams.** The IPO mania that was rampant in the high tech area in the 1990's may have even spilled over to reinsurance. If any of the offshore start-ups have a business plan of selling out after a few years of building up a book of business, I think they will find only modest success. Many of these reinsurers will build successful businesses, but I don't see a compelling reason for them to demand high valuations in such a crowded and competitive market. At least Bermuda is a great place to live for a few years!

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**Winners and Losers...**

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To start, I'd like to take you back to a time when the U.S. life reinsurance industry was quite different from what we see today. It was a long, long time ago—the year—1995. Way back then, there were 18

U.S. reinsurers with market shares of two percent or more. Over the last six years, would you believe that half of those 18 reinsurers have been acquired? Six reinsurers were merged into other reinsurers and no longer exist. The other three acquired reinsurers were left in tact by their new parents.

In Table 1, Swiss Re and the companies it has acquired are shown in bold type. A question for you is: How do you become the largest reinsurer? Simply combine the second, fourth, sixth, and seventh largest reinsurers, and voila! Altogether, Swiss Re acquired four reinsurers over the

**Table 1: U.S. Reinsurers in 1995<sup>1</sup>**

| <u>Rank<sup>2</sup></u> | <u>Company</u>                  | <u>Market Share<sup>2</sup></u> | <u>Acquired By</u> |
|-------------------------|---------------------------------|---------------------------------|--------------------|
| 1                       | Transamerica Re                 | 16%                             | Aegon              |
| <b>2</b>                | <b>Lincoln Re</b>               | <b>13</b>                       | <b>Swiss Re</b>    |
| 3                       | RGA                             | 12                              | MetLife            |
| <b>4</b>                | <b>Life Re</b>                  | <b>8</b>                        | <b>Swiss Re</b>    |
| 5                       | ING Re                          | 6                               |                    |
| <b>6</b>                | <b>Swiss Re</b>                 | <b>6</b>                        |                    |
| <b>7</b>                | <b>Mercantile &amp; General</b> | <b>4</b>                        | <b>Swiss Re</b>    |
| 8                       | AUL                             | 4                               |                    |
| 9                       | Cologne Re                      | 4                               | General Re         |
| 10                      | CNA                             | 4                               | Munich Re          |
| 11                      | BMA                             | 3                               |                    |
| 12                      | Employers Re                    | 3                               |                    |
| 13                      | Phoenix Home                    | 3                               | Employers Re       |
| 14                      | Allianz                         | 3                               |                    |
| 15                      | Hartford Intl Life Re           | 2                               |                    |
| 16                      | Gerling Global                  | 2                               |                    |
| <b>17</b>               | <b>CIGNA Re</b>                 | <b>2</b>                        | <b>Swiss Re</b>    |
| 18                      | Munich Re                       | 2                               |                    |

<sup>1</sup> With a 2% or greater market share

<sup>2</sup> Based on 1995 SOA survey of U.S. ordinary life reinsurance in force, excluding portfolio reinsurance and retrocessions

last six years with a combined 1995 market share of 27 percent. (See table above)

As a result of this consolidation, there are only 12 reinsurers left today that have market shares of 2 percent or more. On average, we've lost one reinsurer per year over the last six years. At this pace, my actuarial forecasting skills tell me there will be no reinsurers left in 12 years!

Now let's look at the current state of the market as shown in

Table 2. Of the top six reinsurers today, Swiss Re, Employers Re, and Munich Re are the clear market share winners. They have vastly increased their combined market share from 11 percent in 1995 to 48 percent in 2001!

In the meantime, Transamerica Re, RGA, and ING Re managed to hold onto a collective 30 percent market share, which is down from 34 percent in 1995.

Six years ago, the top four U.S. reinsurers were U.S.-owned. Today, only four of the top 12 reinsurers are U.S.- owned. Perhaps you've noticed European companies purchasing U.S. life insurers over the last few years. That trend is even stronger among reinsurers. European-owned reinsurers now account for over two-thirds of all U.S. life reinsurance inforce, excluding portfolio reinsurance and retrocessions.

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Table 2: U.S. Reinsurers in 2001<sup>1</sup>

| <u>Rank</u> <sup>2</sup> | <u>Company</u>    | <u>Market Share</u> <sup>2</sup> | <u>Ownership</u> |
|--------------------------|-------------------|----------------------------------|------------------|
| 1                        | Swiss Re          | 30%                              | Swiss            |
| 2                        | Transamerica Re   | 11                               | Dutch            |
| 3                        | RGA               | 11                               | U.S.             |
| 4                        | Employers Re      | 10                               | U.S.             |
| 5                        | Munich Re         | 8                                | German           |
| 6                        | ING Re            | 8                                | Dutch            |
| 7                        | AUL               | 5                                | U.S.             |
| 8                        | Allianz           | 5                                | German           |
| 9                        | BMA               | 3                                | Italian          |
| 10                       | Cologne Re        | 3                                | U.S.             |
| 11                       | Gerling Global    | 3                                | German           |
| 12                       | Annuity & Life Re | 2                                | Bermudan         |

<sup>1</sup> With a 2% or greater market share

<sup>2</sup> Based on 2001 SOA survey of U.S. ordinary life reinsurance in force, excluding portfolio reinsurance and retrocessions, with adjustment to Swiss Re to include Lincoln Re recurring business

<sup>3</sup> Employers Re stands to gain an additional 4% market share pending its acquisition of American United Life's life reinsurance business in 2002

The U.S. life reinsurance market tripled in size from 1995 to 2000. During that time, a number of reinsurers maintained about the same market share, namely RGA, AUL, Cologne Re, BMA, and Gerling Global.

Employers Re and Munich Re tripled their market shares. When combined with the three-fold increase in the size of the market, Employers Re and Munich Re are 10 times larger than they were in 1995. Swiss Re is 15 times larger, with five times the market share it had in 1995.

Two reinsurers, ING Re and Allianz, added a couple of points of market share. Only Transamerica Re lost significant market share, but still managed to double its business in only five years.

As George Santayana said, "Those who cannot remember the past are condemned to repeat it." Now that we've examined our recent past, I'd like to speculate on the future. I will espouse a large

number of questionable opinions. While I am bound to be wrong, I do hope you will find this interesting, provocative and not too offensive. To lessen the risk, I'll talk about companies in small groups.

### The Major Acquirers: Swiss Re, Munich Re, and Employers Re

The clear market share winners over the last five years—Swiss Re, Munich Re, and Employers Re—have three things in common:

- P&C reinsurance as a core business, which has generally produced poor financial results in recent years,
- Deep pockets and
- Major acquisitions in the U.S. life reinsurance market.

For a few years, these three companies stood on the sidelines and watched the U.S. life reinsurance

business growing very fast and passing them by with public companies like RGA and Life Re reporting attractive earnings. Not surprisingly, Swiss Re, Munich Re and Employers Re each decided to expand its U.S. life reinsurance presence through acquisitions. At the same time, each moved its pricing from conservative to more aggressive.

Acquisitions over the last six years have not been cheap—acquirers generally paid top dollar. Having some information about most of these acquisitions, I can tell you roughly what it took to have the winning bid:

- A willingness to settle for a return on capital in the neighborhood of 9-10 percent,
- An assumption that the great majority of expenses could be eliminated through consolidation and

- An assumption that the market share of the acquired company could be added to the market share of the acquiring company, even where that meant maintaining double shares of the new business of many ceding companies.

In general, the acquirers have done a good job of eliminating expenses through consolidation of operations. They have also done a good job of holding onto, and in some cases adding to, market share—largely through an increase in pricing aggressiveness that went well beyond the minor improvement you'd expect from consolidation-related economies of scale.

What does the future hold for these companies? First let's consider Employers Re, which is owned by General Electric. Due to its large property and casualty reinsurance business, financial results have been disappointing, especially by GE standards. GE is not shy about exiting a market that is no longer appealing. Their World Trade Center losses and concerns about future terrorist attacks could result in a decision to sell Employers Re. But who besides Munich Re might be large enough and interested enough to buy Employers Re? With too little demand, GE may elect to keep Employers Re and even expand it.

I expect Swiss Re and Munich Re to buy a little more market share, both through acquisition and aggressive pricing. I expect that they will earn no better than 9 percent of returns on additional capital invested. However, such returns may be quite attractive when compared to recent returns on property and casualty reinsurance.

The futures for Swiss Re and Munich Re hinge on a single question: What will their stockholders demand? The answers to this question hinge in turn on financial reporting issues:

- Will future financial reporting standards allow non-U.S. reinsurers to create earnings on demand by harvesting unrealized capital gains?
- Will non-U.S. reinsurers be able to save excess earnings for a rainy day by storing them in contingency or catastrophe reserves?

If the answers to these questions are “no,” stockholders of non-U.S. reinsurers may be faced with much more volatile earnings going forward.

Munich Re boasts “hidden surplus” of tens of billions of dollars. If this hidden surplus becomes part of publicly reported capital and surplus, will it create a demand among stockholders for distribution of excess capital? Or, if capital is augmented by hidden surplus, will financial results show an unacceptably low return on equity?

My best guess is that change is in the air. Many of these financial reporting changes will happen, but not quickly. However, before the end of this decade, I think you will see several changes including:

- The reporting of more volatile earnings,
- The reporting of more realistic capital and surplus,
- Extraordinary dividends paid to stockholders to distribute excess capital and achieve a better balance between capital and risk and
- A renewed emphasis on the pricing discipline that helped Swiss Re and Munich Re become world-class leaders in the reinsurance business.

My prediction is that over the next few years, Swiss Re will struggle to maintain its market share

while Munich Re acquires additional market share. After that, I expect both companies to lose some ground as they switch their focus from market share to producing satisfactory returns on equity for their stockholders.

### The Friendly Giants: Transamerica Re, RGA, and ING Re

The other three of the top six U.S. reinsurers have grown their businesses organically, rather than through acquisitions. While large in the U.S. life reinsurance business, each of these reinsurers is only a small part of a much larger parent. Transamerica Re is wholly owned by Aegon, RGA is almost 60 percent owned by MetLife, and ING Re is part of ING. For each of these parent companies, reinsurance is not a core business.

I think a strong parental influence has contributed to a generally greater pricing discipline shown by this group in recent years. With luck and cleverness, Transamerica RE, RGA and ING Re may be able to hold onto market share because of their economies of scale, established reputations and relationships and the special products and services they bring to bear.

On the other hand, for the right price, each of these reinsurers could be purchased, just as Lincoln Re was recently purchased by Swiss Re. However, to the extent that these companies produce good financial results and generally keep their owners happy, the right price may be too high for a prospective buyer.

Collectively, I expect Transamerica Re, RGA, and ING Re to gain or lose a little market share over the next few years. Aggressive pricing by acquirers and new entrants would tend to decrease their market shares. Countering this, the desire among ceding companies to spread

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their risk among major reinsurers could help increase their market shares. For example, even with aggressive pricing, it may be impossible for Swiss Re to hold onto a 30 percent market share when most companies prefer to split their reinsurance between four or more reinsurers.

Each of these companies has experienced some large write-offs or significant turnover over the last few years, which cannot be pleasing to their parents. As a result, I would not be surprised if Transamerica Re, RGA and/or ING Re and Transamerica Re were acquired over the next few years.

## The Lonely Lighthouse—American United Life

Nine of the top 10 reinsurers have parents with market capitalization of at least \$20 billion. The lone exception is AUL, whose reinsurance business has lighted its way and become its most important line of business.

As a mutual holding company, AUL has limited access to capital needed to continue its growth. Recent losses from the World Trade Center terrorist attacks may have been the final impetus to AUL's decision to sell its life reinsurance business. With an efficient, good-sized life reinsurance organization, AUL had a choice of buyers. In May of this year, AUL announced the sale of its life reinsurance business to Employers Re.



## The Europeans are Coming!

The Europeans are coming! No, wait—they're already here! We've already reviewed Swiss Re, Munich

Re, Aegon, and ING. That's just the tip of the iceberg.

**Allianz and BMA** are smaller reinsurers with very large parents—so large, in fact, that reinsurance results may be rounding error to their ultimate parents. Allianz and Generali seem to be letting their U.S. operations run their own show as long as results are satisfactory.

While Allianz and BMA are more aggressive pricers than they were five years ago, they still seem to put more emphasis on financial results over market share. Unless results take a turn for the worse, U.S. management should have no incentive to sell their reinsurance operations. I expect Allianz and BMA to maintain or grow their market share. Like other survivors, they should benefit from further consolidation as ceding companies continue to spread their reinsurance among multiple reinsurers.

**Cologne Re**, now called General and Cologne Re, was acquired by General Re in the mid-1990s. Four years ago, General Re was acquired by Berkshire Hathaway, Warren Buffett's company. (Warren is famous for being a distant relative of Jimmy Buffett, but I digress.) In spite of its U.S. ownership, General and Cologne Re's life reinsurance business is primarily European.

In March of 1999, when massive workers compensation losses were disclosed, General Re infused hundreds of millions of dollars to Cologne Re to stabilize the situation and restore customer confidence. Since then, their U.S. life reinsurance unit has experienced some significant turnover, has become understandably more conservative, and its growth has lagged behind most of the industry.

Based on Cologne Re's success in

some life reinsurance markets outside the U.S., I predict that their

U.S. life reinsurance operation will be allowed to continue on its conservative course. Once U.S. market conditions improve and confidence in the life reinsurance business is rebuilt, Warren and Jimmy may surprise us. General and

Cologne Re could find itself a small U.S. player with a very large parent willing to bankroll a tremendous amount of growth.

**Gerling Global** and two smaller U.S. players—**Hannover Re** and **SCOR Re**—are mid-sized, European-based companies specializing in property and casualty reinsurance with life operations in a number of countries around the world.

In the U.S. and some other life reinsurance markets, I see these companies faced with a choice: Either grow the local operation to capture a significant market share or exit the market. I think one or two of these companies will decide to concentrate its resources on its core P&C business, while refocusing life reinsurance efforts primarily on its more profitable domestic market. As a result, expect one or two of Gerling Global, Hannover Re, and SCOR Re to sell its U.S. life reinsurance operations, but not any time soon. I think the remaining one or two mid-size European reinsurers will commit to developing a more significant presence in the U.S. life reinsurance market, primarily through an acquisition over the next few years.

## The Bermuda High

I'll finish with the two significant new entrants to the U.S. mortality risk market—Annuity and Life Re, and Scottish Re—Both Bermuda-based, publicly held companies. These two companies have been quite active in the U.S. life reinsurance market over the last couple of years. Their IPOs in 1998 raised a total of almost \$600 million, along



with considerable pressure from Wall Street to quickly deploy that capital.

These two IPOs were successful because of the rapid growth taking place in the U.S. life reinsurance market coupled with competitive advantages already demonstrated by offshore P&C reinsurers, namely the use of more favorable GAAP accounting, a zero percent corporate tax rate, and the low overhead typically associated with a start-up operation.

As with all new entrants, Annuity and Life Re and Scottish Re have found the U.S. life reinsurance market a hard nut to crack. It takes years to build the relationships and reputation needed to compete on an equal footing with more established players. In the meantime, both reinsurers have compensated by using a low-price strategy to penetrate the market.

Because some clients won't send business offshore and because U.S. tax regulations make it difficult for a non-U.S. taxpayer to market to U.S. customers, both Bermudan reinsurers have established U.S. life reinsurance subsidiaries. Their sales results to date have been truly amazing. Combined, the two companies boast GAAP assets of \$4 billion and GAAP revenue of \$500 million—and this is after less than four years of serving the U.S. market.

Regarding profits, annuity results to date have been disappointing, mainly due to losses from one large annuity block. So far, life results have been encouraging, but life reinsurance results can be distorted by lags in reporting. When you're growing fast and lags are increasing, profits tend to get overstated. I learned that the hard way. When my company's administration finally caught up with the growth of the business, backdated premium refunds knocked earnings for a loop. Thankfully, that was before we were a public company!

Given the thin margins on the business most reinsurers have

written over the last few years, profits are more sensitive than ever to the effect of lags. A company with a low-price strategy would have profits even more sensitive to lags.

My best guess is that, over the next few years, the Bermudan reinsurers will show a return on capital that disappoints investors. Both companies have seen their stock prices fall to within a few percent of age points their book values. If the stock price were to fall much below book value, there would be pressure to sell or liquidate the company. If one company performs much better than the other, look for the better performer to acquire the other and merge the two operations.

### A Look Ahead to 2006

In summary, over the next four years, I think the U.S. market will consolidate down to eight significant reinsurers with market shares of three percent or more. I think the eight winners will face a more stable future, with little or no additional consolidation, few new entrants, and pricing that more regularly produces satisfactory returns to shareholders, at least on new business.

As a postscript, I'd like to point out that there are strong forces at work that may be bringing more pricing discipline to the market as you read this:

- The demand and perceived value of reinsurance is up and, due to capital losses and World Trade Center losses, the supply is down. That should cause reinsurance prices to firm up.
- Losses from the terrorist attacks and other recent earnings surprises are causing many reinsurers to reexamine their approaches to pricing, risk management and the connection between the two.
- The Enron scandal has many reinsurers reexamining the

risks associated with moving business offshore, including unknown future letter-of-credit availability and costs, the financial handcuffs associated with long term placement of assets in trust and the risks associated with guaranteeing offshore companies.

- Some reinsurers have accumulated and analyzed a mountain of relevant mortality and lapse information by tracking the results of many millions of individual policies. This enables them to make better pricing decisions. Reinsurers without such information could become the victims of those that have it.

If these forces produce a stabilizing or upward influence on prices, profit margins and returns will rise, but probably at the expense of slower growth, since reinsurance sales are made to very astute and extremely price-sensitive buyers. In the past, many reinsurers have been able to walk the fine line that combines rapid growth with adequate profitability. As the U.S. life reinsurance market consolidates, this will become both more difficult due to the stronger competitors and easier due to fewer competitors.

Four years from now, you may recall this article and marvel at how incredibly wrong these predictions were. It might be interesting to follow up in 2006.

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## SPRA Pools in Light of September 11<sup>th</sup> Tragedies

by James B. Keller

*Editor's Note: As mentioned previously in this newsletter, this article was originally part of the Special Edition Newsletter that never was. The Reinsurance Section asked Jim to prepare this article on the SPRA for the newsletter. While SPRA is associated with Swiss Re, this is not an advertisement for business, but is for informational purposes only. Thank you, Jim, for the article.*

September 11, 2001, was unprecedented in its tragic ramifications on both a personal and business level. Insurers, whose business is to manage risk, are now looking at new issues and questions about how to manage a world whose risks include such horrific acts. The property and casualty industry has a proposed bill in Congress for establishing a terrorism reinsurance pool. The ACLI has been discussing a potential high-level government backstop for the life insurance industry.

Insurance companies use various mechanisms to control volatility of risks, and ultimately, solvency. Companies set a maximum amount, i.e., a retention, which they will retain on any one life. Some may also use first-dollar quota share to further reduce volatility. Even with these elements, many insurance companies take steps to reduce the effects of a catastrophe, which, in insurance terms, is defined as an event causing the insured to have three or more claims that add up to more than some predetermined deductible.

One way to reduce a catastrophe's effects is to buy traditional catastrophe coverage. Another is to participate in a catastrophe pool. Both are typically one-year coverages. With a traditional coverage, the premiums (the insured costs) are known upfront. The pool, on the other hand, should result in longer-term lower net costs and can cover risks that are too unpredictable to be priced for in a traditional cover.

### SPRA's assessment pools

Special Pooled Risk Administrators, Inc. (SPRA)

administers both an ordinary and a group assessment catastrophe pool. Each member has a share of the pool (either ordinary or group) based on the company's in force and number of policies relative to all others in the pool. When a catastrophe does occur and a member has three or more claims above its deductible, all members are assessed. To make an assessment pool work well, you need a significant number of companies. This allows a substantial maximum claim cover while still limiting the potential assessment to any single member.

SPRA pools are fortunate to enjoy a wide number of companies with substantial in force. Currently, the ordinary pool represents 111 life companies with more than \$3 trillion of in force (roughly a third of the industry). Through unique formulas to determine the deductibles and pool shares, large and small companies are treated equitably. As such, a wide variety of company sizes are represented. The pool maximums are \$50 million per company and \$125 million in aggregate. The group pool has 42 life companies with \$1 trillion of in force (roughly a sixth of the industry). The maximums are \$0.20/1000 (\$200 million) and \$0.50/1000 (\$500 million).

### Questions after September 11

The tragedy of September 11, 2001, was unprecedented for the SPRA pools. Although the pools have been around for more than 25 years and have administered more than \$50 million of catastrophic claims, nothing has ever come close to the impact of September 11. Estimates from the ordinary members total \$250 million, and estimates from the group members total \$160 million.

Not surprisingly, experience is anything but uniform by company. Several companies, both large and small, had very few claims. Several other companies (again both large and small) had a disproportionate

amount of claims. The pool will do what it was designed to do—spread the effects of the catastrophe evenly over its member base.

The terrorist attack does cause some challenges in administering the pools. For example:

- **How many insurable events were there?** Most within the industry have argued the World Trade Center's Twin Tower attack of Sept. 11 was a single event, citing the "cause" analysis with various case law examples. But others (such as the owner of the World Trade Center's Twin Towers) have suggested each tower attack should be treated as a separate insurable incident. SPRA has informed its members that it accepts the "cause" analysis and intends to administer the attacks as one event.
- **Should the ordinary limit be raised?** Given that one event occurred, an aggregate limit of \$125 million and estimates of \$250 million, only 50 percent of the claims are being spread.
- **Where do we go from here?** Many are saying the world has now changed. Several companies are finding at renewal that traditional catastrophe covers are more limited in scope (excluding terrorism and/or war) and premiums have been increased. SPRA is soliciting input from its members on any potential changes going forward.

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## Highlights of the 2001 Manulife Reinsurance Mortality Study

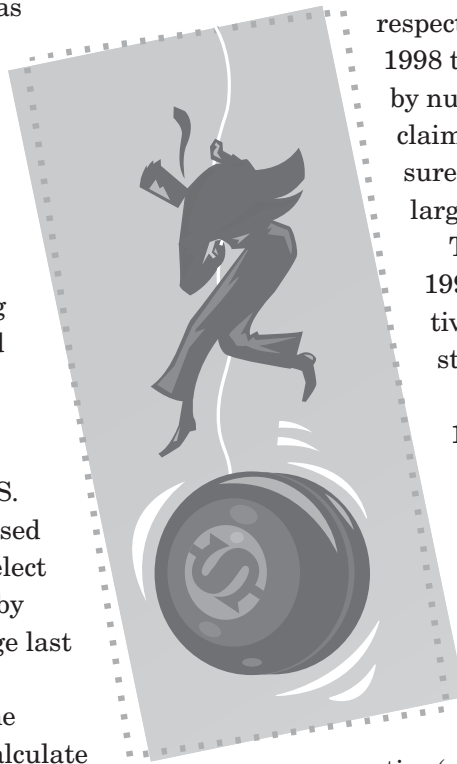
by Manon Laverdière and Valerio Valenti

*Editor's Note: Copies of the full studies (text and tables) are available in the Reinsurance Section area of the SOA home page [www.soa.org](http://www.soa.org).*

**M**anulife Reinsurance, in conjunction with the Reinsurance Council of the Society of Actuaries, conducts an annual study of mortality experience on large amount and older age policies. The experience data was submitted to the Society of Actuaries by six companies. The consolidated data is analyzed in terms of mortality ratios by number and amount, and the results are further subdivided by age, sex, duration, smoking and underwriting status, reinsurance method and level of retention.

The exposure includes only single life policies issued in the United States and valued in U.S. dollars. Expected deaths are based on 100% of the SOA 1975-80 Select & Ultimate table which varies by age and sex, age nearest and age last birthday. The basic tables were extended to issue age 90 and the resulting tables were used to calculate the expected mortality for issue ages greater than 70. Ultimate ages were also extended to age 105 from age 100, starting with the 1991 study.

The 2001 Large Amount study covers experience for calendar years 1997 and 1998. Manulife has been conducting these studies since 1990, covering experience during calendar years 1987 and later. The Advanced Age study has been conducted since 1993, covering experience in calendar years 1990 and later. Both studies present results individually for each of the two most recent calendar years as well as a cumulative result of all study years. The results of the Advanced Age and Large Amount studies will be discussed separately.



### 2001 Large Amount Study: Results

*Policies for large amounts are those with a total face amount greater than \$1 million.*

#### 1997 and 1998 Results:

The experience underlying the 1997 and 1998 data is based on total exposures of \$64 billion and \$77 billion, respectively. Claims in 1997 were \$77 million and in 1998 they were \$101 million. The total 1997 exposure by number is 231,965 (275,823 in 1998). In 1997, 168 claims were reported (353 in 1998). The 1998 exposures by number and total claims represent the largest in this study's history.

The overall mortality ratios by amount for the 1997 and 1998 study are 34% and 37%, respectively. By number, the ratios for the 1997 and 1998 study are 27% and 48%, respectively.

#### 1987 to 1998 Results:

The experience underlying the 1987 to 1998 data is based on a total exposure of \$780 billion and claims of \$1.6 billion. The total exposure by number is 1,597,918 with 2,395 claims.

The overall ratio by amount is 56 percent. This ratio decreases slightly when measured on a "by number" basis to 54 percent.

This year's study includes an analysis of the ratios (and supporting exposure) by a five year rolling average and a four year period average. The additional data allows the reader to more easily view the mortality trends and assign credibility to those trends.

The mortality ratios are also presented for various classifications—first for 1997 and 1998 experience, and then the cumulative result for the entire study period from 1987 to 1998.

#### Sex:

Males comprise approximately 88% of the 1997 and 1998 exposure by number (and by amount). Close to one-fifth of all male claims are classified as misadventure.

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The mortality ratio by amount for males in 1997 is 38% and for females it is 11% (1998: 38% for males, 33% for females).

The mortality ratio by number in 1997 is 28% for males and 16% for females (1998: 47% for males, 53% for females).

Based on data from 1987 to 1998, the mortality ratio by amount for males is 55% and for females it is 62%. During this period male exposure was 90%. By number, the mortality ratios are 53% and 59% for males and females, respectively. Over the years female mortality has shown more improvement than male mortality.

*Issue Age:* Issue ages 30-49 represent approximately 75% of the 1997 and 1998 exposure by number and approximately 70% of the exposure by amount. However, actual claims paid are highest in the age category 50-59 for both the 1997 and 1998 data.

The mortality ratio by amount in 1997 is 40% for issue ages 50-59 (38% in 1998). By number the 1997 ratio is 34% (51% in 1998).

From 1987 to 1998, 54% of the largest claims (over \$5 million) were in the age band 50 to 69.

*Policy Years:* Exposure by number and by amount is the highest for the first two policy durations. The 1997 mortality ratio by number for duration one and two is 19% and 30%, respectively (36% and 29% in 1998). This compares favorably when compared to the average ratios for all durations (27% in 1997, 48% in 1998).

The 1997 mortality ratio by amount for both durations one and two is 16%. The 1998 ratios are 26% and 20%, respectively. Both 1997 and 1998 ratios are considerably better than the overall amount average of 34% in 1997 and 37% in 1998.

The 1987 to 1998 cumulative mortality ratio by amount at duration one is 55% (partly due to large aviation claims in the study's early years). It then decreases at duration two (44%) and increases over the next two durations from 51% to 56%.

In 1997 and 1998, seven out of the 19 claims with Direct Face Amounts over \$5 million occurred during the first three policy durations, the remaining claims occurred in duration six and over.

*Smoking Status:* The mortality ratio by amount for non-smokers is 34% in both 1997 and 1998. The ratio for smokers is 56% in 1997 (49% in 1998). The exposure by amount in 1997 for non-smoker, smoker and aggregate policies are 71%, 6%, and 23% respectively (In 1998, 89%, 6%, 5%).

The overall ratios (1987-1998) by amount for non-smoker and smoker are 48% and 104%, respectively. The ratio of smoker to non-smoker mortality has decreased considerably over the years. In fact, in some years the smoker ratio is less than the non-smoker ratio. However, the smoker exposure by amount is only 7% of the study and thus has low credibility.

Note that the expected 75-80 Basic Tables are not differentiated by smoker status.

*Underwriting**Status:*

The mortality ratio by amount for standard policies is 32% in 1997 (34% in 1998). For substandard policies, the ratio increases to 47% in 1997 and to 59% in 1998. Approximately 96% of the exposure is accounted for by standard policies.

The overall standard ratio by amount from 1987 to 1998 is 56% (55% for substandard).

*Reinsurance**Status:*

The 1997 mortality ratio by amount is 21% for automatic business, and 55% for facultative (1998: 36% for automatic and 40% for facultative). The exposure by dollar amount is approximately 80% for automatic business in both 1997 and 1998.

The 1987 to 1998 overall amount ratio is 47% for automatic and 64% for facultative business. The facultative exposure has decreased steadily since the study's inception. In the late 1980s, facultative business comprised more than 50% of the study's data.

*Plan of**Insurance:*

A large portion of contributors did not submit a plan of insurance code, and therefore, the results by plan are not very credible.

The plan of insurance was provided for approximately half of the business submitted (and almost all of it was for Term) for 1997 and 1998 data. In 1997, Term had a 22% ratio by number and 38% ratio by amount (in 1998 the ratios were 47% and 43%, respectively).

*Method of**Reinsurance:*

The 1997 mortality ratio by amount is 30% for YRT and 37% for Coinsurance (1998 ratios are 26% and 20%, respectively).

Data collection for reinsurance method began in 1991. The 1991 to 1998 mortality ratio by amount is 48% for YRT and 50% for Coinsurance.

**2001 Advanced Age Study: Results**

*Policies for advanced age are those with an issue age of 70 or over.*

**1997 and 1998 Results:**

The experience underlying the 1997 and 1998 data is based on total exposures of \$1.9 billion and \$2.3 billion, respectively. Claims in 1997 were \$12 million and in 1998 they were \$19 million. Total exposure by number in 1997 and 1998 was 20,578 and 28,175, respectively. In 1997, 237 claims were reported (333 in 1998). The 1997 and 1998 exposure by number and the 1998 claim number are the largest in this study's history.

The overall mortality ratios by amounts for the 1997 and 1998 study are 19% and 24%, respectively. By number, the ratio for the 1997 data is 27% (31% in 1998).

**1990 to 1998 Results:**

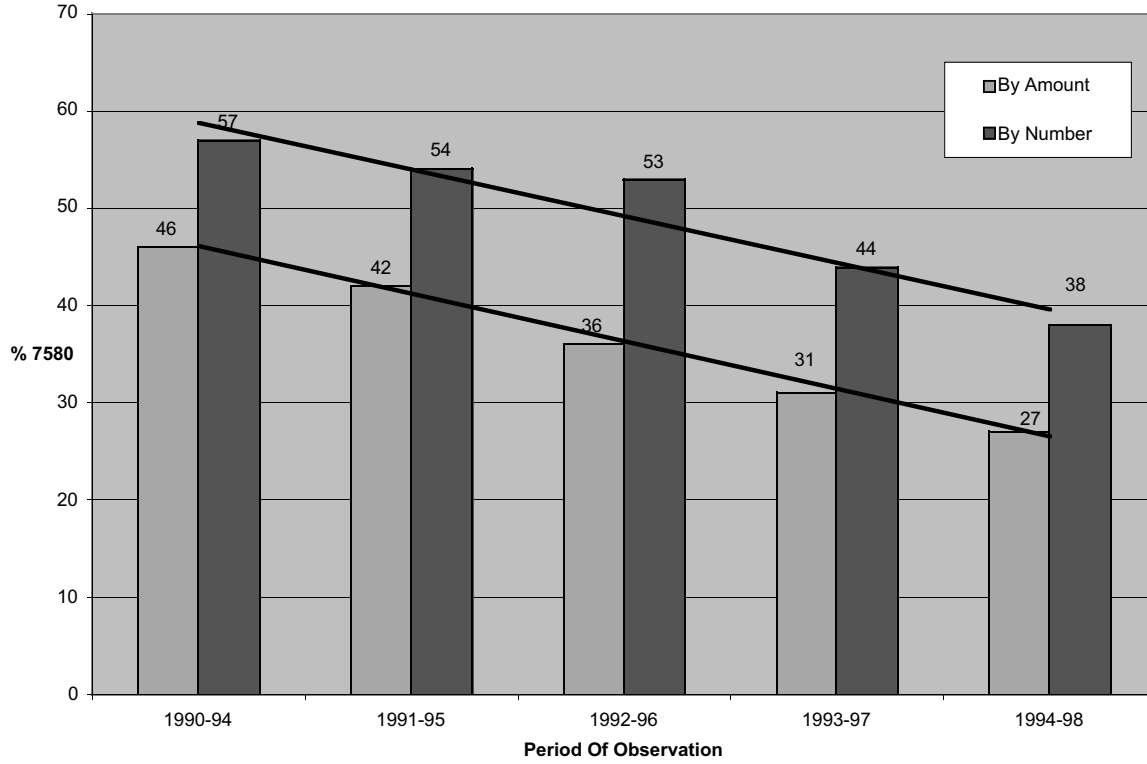
The experience underlying the years 1990 to 1998 is based on a total dollar exposure of \$15.5 billion. During those years, \$188 million of claims were experienced. The total 1990 to 1998 exposure by number is 115,106 policies with 2,023 claims.

The overall mortality ratio by amount for the 1990 and 1998 study is 36%. By number, the overall ratio is 45%.

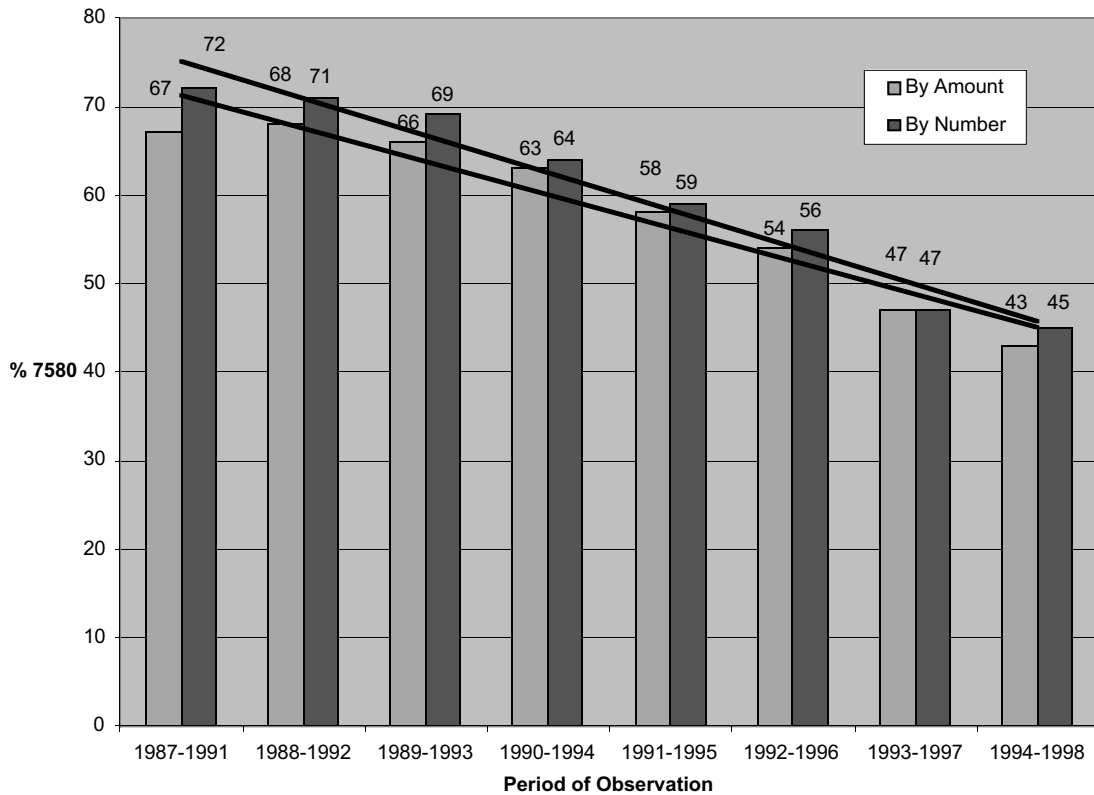
Highlights of the 2001 ...

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Reinsurance Inter-Company Mortality Study  
Advanced Age - 5 Year Rolling Averages



Reinsurance Inter-Company Mortality Study  
Large Amount - 5 Year Rolling Averages



|           |  | Advanced Age Inter-Company Mortality Study |         |         |         |         |
|-----------|--|--|---------|---------|---------|---------|
|           |  | 1990-94                                    | 1991-95 | 1992-96 | 1993-97 | 1994-98 |
| By Amount |  | 46   | 42      | 36      | 31      | 27      |
| By Number |  | 57   | 54      | 53      | 44      | 38      |

|           |  | 1987-91 | 1988-92 | 1989-93 | 1990-94 | 1991-95 | 1992-96 | 1993-97 | 1994-98 |
|-----------|--|---------|---------|---------|---------|---------|---------|---------|---------|
| By Amount |  | 67      | 68      | 66      | 63      | 58      | 54      | 47      | 43      |
| By Number |  | 72      | 71      | 69      | 64      | 59      | 56      | 47      | 45      |

There is a decreasing trend in both ratios when analyzed on each of a moving average and period average.

The mortality ratios are also presented for the various classifications, first for 1997 and 1998 experience and then the cumulative result for the entire study period from 1990 to 1998.

**Sex:** In 1997 and 1998, 45% of policy amounts were from male lives. This marks the first time in this study's history that female amounts outnumber the male amounts.

By amount, the ratio for males is 20% in 1997, and 22% in 1998. By amount the ratio for females is 17% in 1997 and 27% in 1998.

The mortality ratios by number for males in 1997 and 1998 are 27% and 29%, respectively. Similarly, the female by number ratios are 28% in 1997 and 33% in 1998.

The mortality ratios by amount for 1990 to 1998 data are 35% for males and 38% for females. Ratios by number during the period are 44% and 46% for males and females, respectively.

**Issue Age:** By amount, approximately 65% of policies (75% by number) have issue ages between 70 and 74 in both 1997 and 1998. By amount in 1997, the age

band 70 to 74 experienced a ratio of 14% (27% in 1998). The age band 75 to 79 experienced a 30% ratio in 1997 (26% in 1998).



**Policy Years:** By policy year, the ratios vary greatly from one duration to the next.

In 1998, approximately half of all exposures by number and by amount are in durations one and two, compared to 41% for the 1997 data. The mortality ratio by amount at duration 1 is 16% in 1997 and 24% in 1998.

From 1990 to 1998, the overall by amount ratio for duration one is 31%.

## Highlights of the 2001 ...

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**Smoking Status:** The 1997 non-smoker and smoker ratios by amount are both approximately 19%. The 1998 non-smoker ratio by amount is 24%, and surprisingly the smoker ratio is lower at 16%. However, since there are far fewer smoker exposures (10% vs. 90% for non-smokers), the validity of the smoker result is weak.

From 1990 to 1998, the ratio by amount for non-smoker is 31% (63% for smoker).

### *Underwriting Status:*

The mortality ratio by number for standard policies is 23% and 22%, for 1997 and 1998 data, respectively. The 1997 substandard ratio by amount is 8% (29% for 1998 data). However, the standard exposure is nearly four to five times more than substandard exposure. The cumulative 1990 to 1998 by amount ratio for standard policies is 37% and for substandard it is 35%. 81% of the exposure by amount is comprised of standard policies.

### *Reinsurance Status:*

In 1997 and 1998, the exposure by number for automatic reinsurance is approximately 90% for both years. However, the exposure by amount for automatic business comprises on average 65% of the study's data.

The ratio by amount for policies reinsured automatically is 20% (17% for facultative) for 1997 data, and 21% (28% for facultative) for 1998 data.

The 1990 to 1998 cumulative ratio by amount for policies reinsured automatically is 32%, compared to 39% for facultative policies. In the study's



early years (1990 to 1992), facultative was approximately double the automatic exposure by amount. However, in the last few years, automatic reinsurance is now double the facultative exposure.

### *Plan of Insurance:*

In this year's two year study, many policies were classified as Unknown (1997: 48% by amount; 1998: 44%). The 1997 Term mortality ratio by amount is 30% (40% in 1998).

From 1990 to 1998, by dollar amount, Whole Life, Term and UL mortality ratios are 28%, 46% and 35%, respectively. By number, Whole Life, Term and UL mortality rates are 50%, 33%, and 50%, respectively.

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## The Relationship of Mortality Projections and The Underlying Mortality Tables Used

by Larry Warren

### Introduction

The 1975-80 Select and Ultimate mortality table has continued to serve the actuarial profession very effectively over the decades. Scaling factors were updated and minor adjustments were made as an attempt to keep this table current. All prototypes, however, need to be re-evaluated from time to time in order to ensure appropriateness and accuracy. Changes in lifestyles, medical advances, new underwriting requirements and risk classifications, etc. can effect mortality patterns and need to be recognized. In this paper it will be shown that the result of using the 1975-80 Select and Ultimate Table as opposed to the more modern 1990-95 Select Ultimate Table can be a significant understatement of future mortality and hence, anticipated profits may prove to be illusory.

Projecting future mortality has been referred to as an art as well as a science. Mortality projections/assumptions are used in many different situations and for many different purposes (from calculating profit margins to demonstrating company solvency). Some examples are pricing new products, cash flow testing, analysis of reinsurance costs (i.e. reinsurance premiums vs. future expected mortality), self-support testing (under the NAIC Model Illustration Regulation, under New York section 4228, etc.), reserve adequacy testing, valuing inforce blocks of business, etc.

The development of mortality projections/assumptions typically takes into consideration company mortality experience, industry mortality experience, or a combination of both. In establishing a

mortality assumption for developing new products the pricing actuary often would begin with the mortality experience of recently issued policies of a particular type of product and make some adjustments for possible changes in new underwriting requirements, average face amount, persistency, or any other factor that may have an impact on future mortality.

The appropriate mortality experience, therefore, would be limited to the early durations of newer products, which would have most likely been issued using underwriting guidelines and requirements similar to what is currently being used or will be used in the near future. In performing cash flow testing, reserve adequacy testing, valuing an inforce block of business (possibly for sale or acquisition), etc. the valuation actuary would begin with the mortality experience of policies issued over a longer time frame.

Perhaps issued over a period of 10 to 20 or more years, which would be more representative of the company's entire inforce business. The reinsurance actuary, whether from the ceding company perspective (analyzing reinsurance quotes by comparing them with future expected mortality) or the assuming company perspective (developing a reinsurance quote that properly reflects future expected mortality), would be interested in mortality experience of recently issued policies

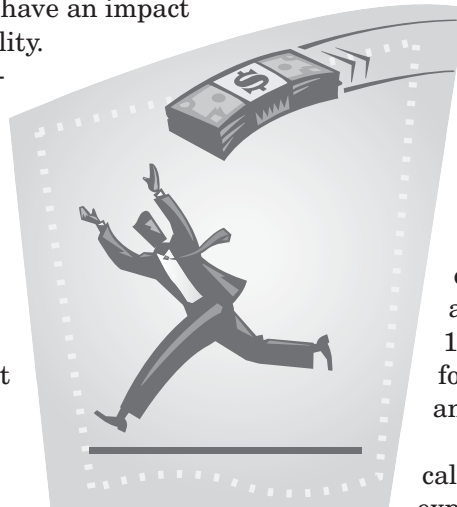
in reinsuring new business and policies issued "many" years ago in reinsuring inforce business.

### General Approach

We started with a simple model using the assumption that \$10,000,000 face amount was

issued each year for each issue age (25, 35, 45 and 55) and experiencing Linton "B" lapse rates (20%, 12%, 10%, 8.8%, 8%, etc.) We also formed a composite issue age by assuming the distribution of face amount by age was 15%, 35%, 35% and 15% for issue ages 25, 35, 45 and 55 respectively.

We used this model to calculate actual to expected mortality ratios (for each mortality table) for policies in their first three policy years. (Expected mortality was calculated by using a single year of issue, applying lapse rates and multiplying the appropriate  $qx$ 's to the face amount exposed in durations one through three.) Actual mortality was arbitrarily assumed to equal 80% of the 1990-95 table. This assumption was totally arbitrary and has no impact on this analysis. Next, we calculated the 20-year present value of future claims (for a single year of issue, representing new business) using the  $qx$ 's of each mortality table separately. That is, the actual to expected mortality ratio obtained by using the 1975-80 mortality table was applied to the 1975-80 mortality table in calculating the 20 year present value of claims, and analogously for the



**The Relationship of ...**

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1990-95 mortality table. We then repeated this process using the first five policy years to see if the results would differ significantly. (Table 1) We also used this model to calculate actual to expected mortality ratios (for each mortality table) for inforce blocks represented by policies in later durations. We then similarly calculated the 20-year present value of future claims. (Table 2)

**Results**

It was shown that where the actual to expected mortality ratios were based on mortality experience of the first three policy years that using the 1975-80 Select and Ultimate Mortality Table produces

a present value of future claims (male composite) that are 13% lower than what would be obtained by using the 1990-95 select/ultimate mortality table. This reduction varies significantly by issue age: 32% lower at issue age 25, and becomes 14% lower, 22% lower, and 2% lower for issue ages 35, 45, and 55 respectively.

The results for females were similar but not as extreme. The present value of future claims (female composite) are 10% lower when using the 1975-80 table as opposed to using the more recent 1990-95 table.

Surprisingly enough, our analysis showed that even if the actual to expected mortality ratios were based on the mortality experience of the first five policy years, the above

relationships would be similar. It was also shown for inforce blocks that this relationship still holds but is less dramatic.

It became clear that the 1975-80 table generally produced mortality projections considerably lower than the more recent 1990-95 table. To gain insights into the significance of the mortality differentials between these tables we developed a simple model to calculate the reduction in the present value of future claims over 20 years based on a single year of issue (assuming Linton B lapses and a discount rate of 6%) resulting from annual mortality improvement (reduction) factors for all 20 years. This analysis was done for ages 25 and 55, male and female, and both mortality tables (1975-80 and 1990-95). The results were that a 1.0%

**Table 1**

**RELATIONSHIP OF MORTALITY PROJECTIONS AND THE UNDERLYING MORTALITY TABLES**

**FOR A SINGLE YEAR OF ISSUE**

| SCENARIO 1  |                      |                      |       |            | SCENARIO 2  |                      |                      |       |            |
|---|----------------------|----------------------|-------|------------|---|----------------------|----------------------|-------|------------|
| PRESENT VALUE OF FUTURE CLAIMS *                                |                      |                      |       |            | PRESENT VALUE OF FUTURE CLAIMS *                                |                      |                      |       |            |
| (based on the mortality experience of the first 3 policy years) |                      |                      |       |            | (based on the mortality experience of the first 5 policy years) |                      |                      |       |            |
| males   |                      |                      |       |            | males   |                      |                      |       |            |
| issue age   | based on 75-80 table | based on 90-95 table | ratio | % decrease | issue age   | based on 75-80 table | based on 90-95 table | ratio | % decrease |
| 25  | \$ 27,337            | \$ 40,456            | 67.6% | 32.4%      | 25  | \$ 31,784            | \$ 40,456            | 78.6% | 21.4%      |
| 35  | 54,334               | 63,082               | 86.1% | 13.9%      | 35  | 56,328               | 63,082               | 89.3% | 10.7%      |
| 45  | 123,820              | 158,473              | 78.1% | 21.9%      | 45  | 124,051              | 158,473              | 78.3% | 21.7%      |
| 55  | 370,761              | 377,786              | 98.1% | 1.9%       | 55  | 372,220              | 377,786              | 98.5% | 1.5%       |
| composite**   | \$ 122,069           | \$ 140,281           | 87.0% | 13.0%      | composite**   | \$ 123,733           | \$ 140,281           | 88.2% | 11.8%      |

| PRESENT VALUE OF FUTURE CLAIMS *                                |                      |                      |        |            | PRESENT VALUE OF FUTURE CLAIMS *                                |                      |                      |        |            |
|---|----------------------|----------------------|--------|------------|---|----------------------|----------------------|--------|------------|
| (based on the mortality experience of the first 3 policy years) |                      |                      |        |            | (based on the mortality experience of the first 5 policy years) |                      |                      |        |            |
| females   |                      |                      |        |            | females   |                      |                      |        |            |
| issue age   | based on 75-80 table | based on 90-95 table | ratio  | % decrease | issue age   | based on 75-80 table | based on 90-95 table | ratio  | % decrease |
| 25  | \$ 16,493            | \$ 22,222            | 74.2%  | 25.8%      | 25  | \$ 17,735            | \$ 22,222            | 79.8%  | 20.2%      |
| 35  | 37,547               | 44,728               | 83.9%  | 16.1%      | 35  | 38,904               | 44,728               | 87.0%  | 13.0%      |
| 45  | 91,718               | 118,935              | 77.1%  | 22.9%      | 45  | 99,959               | 118,935              | 84.0%  | 16.0%      |
| 55  | 292,919              | 272,221              | 107.6% | -7.6%      | 55  | 290,298              | 272,221              | 106.6% | -6.6%      |
| composite**   | \$ 91,655            | \$ 101,449           | 90.3%  | 9.7%       | composite**   | \$ 94,807            | \$ 101,449           | 93.5%  | 6.5%       |

\* Based on a single year of issue of \$10 million face amount for each age assuming Linton B lapses at 6% discount rate over a 20 year period.

\*\* Using the distribution of 15%,35%,35%,15% for ages 25,35,45,55 respectively.

note: The mortality experience underlying this analysis was arbitrarily chosen to equal 80% of the 90-95 Table. All ratios shown however, are independent of this assumption.



Table 2

EXHIBIT 2

RELATIONSHIP OF MORTALITY PROJECTIONS AND THE UNDERLYING MORTALITY TABLES

FOR INFORCE BUSINESS

SCENARIO 1

SCENARIO 2

SCENARIO 3

PRESENT VALUE OF FUTURE CLAIMS \*  
(based on an inforce containing 5 years of new business)

PRESENT VALUE OF FUTURE CLAIMS \*  
(based on an inforce containing 10 years of new business)

PRESENT VALUE OF FUTURE CLAIMS \*  
(based on an inforce containing 15 years of new business)

| issue age   | males                |                      |                      | ratio | % decrease | issue age   | males                |                      |                      | ratio  | % decrease |
|-------------|----------------------|----------------------|----------------------|-------|------------|-------------|----------------------|----------------------|----------------------|--------|------------|
|             | based on 75-80 table | based on 90-95 table | based on 90-95 table |       |            |             | based on 75-80 table | based on 90-95 table | based on 90-95 table |        |            |
| 25          | \$ 161,618           | \$ 230,208           | \$ 230,208           | 70.2% | 29.8%      | 25          | \$ 400,171           | \$ 477,958           | \$ 477,958           | 83.7%  | 16.3%      |
| 35          | 351,082              | 409,330              | 409,330              | 85.8% | 14.2%      | 35          | 823,528              | 924,597              | 924,597              | 89.1%  | 10.9%      |
| 45          | 799,844              | 1,066,309            | 1,066,309            | 75.0% | 25.0%      | 45          | 2,126,564            | 2,445,817            | 2,445,817            | 86.9%  | 13.1%      |
| 55          | 2,496,462            | 2,505,651            | 2,505,651            | 99.6% | 0.4%       | 55          | 6,184,557            | 5,800,633            | 5,800,633            | 106.6% | -6.6%      |
| composite** | \$ 801,536           | \$ 926,853           | \$ 926,853           | 86.5% | 13.5%      | composite** | \$ 2,020,241         | \$ 2,121,433         | \$ 2,121,433         | 95.2%  | 4.8%       |

PRESENT VALUE OF FUTURE CLAIMS \*  
(based on an inforce containing 5 years of new business)

PRESENT VALUE OF FUTURE CLAIMS \*  
(based on an inforce containing 10 years of new business)

PRESENT VALUE OF FUTURE CLAIMS \*  
(based on an inforce containing 15 years of new business)

| issue age   | females              |                      |                      | ratio  | % decrease | issue age   | females              |                      |                      | ratio  | % decrease |
|-------------|----------------------|----------------------|----------------------|--------|------------|-------------|----------------------|----------------------|----------------------|--------|------------|
|             | based on 75-80 table | based on 90-95 table | based on 90-95 table |        |            |             | based on 75-80 table | based on 90-95 table | based on 90-95 table |        |            |
| 25          | \$ 102,082           | \$ 134,721           | \$ 134,721           | 75.8%  | 24.2%      | 25          | \$ 273,811           | \$ 295,742           | \$ 295,742           | 92.6%  | 7.4%       |
| 35          | 242,197              | 299,178              | 299,178              | 81.0%  | 19.0%      | 35          | 524,719              | 687,496              | 687,496              | 76.3%  | 23.7%      |
| 45          | 624,419              | 791,014              | 791,014              | 78.9%  | 21.1%      | 45          | 1,490,873            | 1,786,448            | 1,786,448            | 83.5%  | 16.5%      |
| 55          | 1,939,427            | 1,796,045            | 1,796,045            | 108.0% | -8.0%      | 55          | 4,128,255            | 4,080,374            | 4,080,374            | 101.2% | -1.2%      |
| composite** | \$ 609,542           | \$ 671,182           | \$ 671,182           | 90.8%  | 9.2%       | composite** | \$ 1,365,767         | \$ 1,522,298         | \$ 1,522,298         | 89.7%  | 10.3%      |

These inforce blocks were developed from 5, 10, and 15 years of new business of \$10 million face amount for each age.

\* Using the distribution of 15%, 35%, 35%, 15% for ages 25, 35, 45, 55 respectively.

note: The mortality experience underlying this analysis was arbitrarily chosen to equal 80% of the 90-95 Table. All ratios shown however, are independent of this assumption.

The Relationship of ...

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Table 3

**EFFECT OF MORTALITY IMPROVEMENT FACTORS  
ON MORTALITY PROJECTIONS (20 YEARS)**

| 75-80 mortality table          |                          | 90-95 mortality table          |                          | 75-80 mortality table          |                            | 90-95 mortality table          |                            |
|--------------------------------|--------------------------|--------------------------------|--------------------------|--------------------------------|----------------------------|--------------------------------|----------------------------|
| mortality improvement factor * | male age 25 % decrease** | mortality improvement factor * | male age 25 % decrease** | mortality improvement factor * | female age 25 % decrease** | mortality improvement factor * | female age 25 % decrease** |
| 0.00%                          | 0.0%                     | 0.00%                          | 0.0%                     | 0.00%                          | 0.0%                       | 0.00%                          | 0.0%                       |
| 0.50%                          | 3.6%                     | 0.50%                          | 4.1%                     | 0.50%                          | 4.2%                       | 0.50%                          | 4.4%                       |
| 1.00%                          | 6.9%                     | 1.00%                          | 8.0%                     | 1.00%                          | 8.2%                       | 1.00%                          | 8.6%                       |
| 1.50%                          | 10.1%                    | 1.50%                          | 11.6%                    | 1.50%                          | 11.9%                      | 1.50%                          | 12.5%                      |

| 75-80 mortality table          |                          | 90-95 mortality table          |                          | 75-80 mortality table          |                            | 90-95 mortality table          |                            |
|--------------------------------|--------------------------|--------------------------------|--------------------------|--------------------------------|----------------------------|--------------------------------|----------------------------|
| mortality improvement factor * | male age 55 % decrease** | mortality improvement factor * | male age 55 % decrease** | mortality improvement factor * | female age 55 % decrease** | mortality improvement factor * | female age 55 % decrease** |
| 0.00%                          | 0.0%                     | 0.00%                          | 0.0%                     | 0.00%                          | 0.0%                       | 0.00%                          | 0.0%                       |
| 0.50%                          | 5.1%                     | 0.50%                          | 5.0%                     | 0.50%                          | 4.9%                       | 0.50%                          | 4.9%                       |
| 1.00%                          | 9.8%                     | 1.00%                          | 9.6%                     | 1.00%                          | 9.5%                       | 1.00%                          | 9.5%                       |
| 1.50%                          | 14.3%                    | 1.50%                          | 14.0%                    | 1.50%                          | 13.9%                      | 1.50%                          | 13.8%                      |

\* Compounded each year for years 1-20.

\*\* Reduction in present value of future claims based on a single year of issue assuming Linton B lapses at a 6% discount rate over 20 years.

annual improvement factor over all 20 years (a somewhat aggressive assumption) produces a decrease in the present value of future claims ranging from 7% to 10%, while using a 1.5% annual improvement factor over all 20 years (a very aggressive assumption) produces a decrease ranging from 10% to 14%. (Table 3) It now becomes quite apparent that for many issue ages the decrease in the present value of future claims resulting from using the 1975-80 Select and Ultimate Table as opposed to the 1990-95 Select and Ultimate Table, is often greater than the decrease in the present value of future claims resulting from using aggressive mortality improvement factors.

## Observations and Conclusions

The relationship of mortality projections and the underlying mortality tables turns out to be quite significant. The majority of companies continue to use the 1975-80 Select and Ultimate Mortality Table. ***The actuary in making the decision to utilize the 1975-80 Select and Ultimate mortality table (as opposed to the 1990-95 Select and Ultimate mortality table) may unwittingly be taking an aggressive posture when it comes to projecting future claims.*** The significant decrease in the present value of future claims resulting from using the 1975-80 Select and Ultimate Table as opposed to the 1990-95 Select and Ultimate Table results from the fact that the slope of the 1990-95 table is higher than that of the 1975-80 table (i.e. in the early years the ratio of the  $qx$ 's of the 1990-95 table to the 1975-80 table are lower than they are in the later years). Each of these tables was based on the SOA Inter-company Mortality Study on Standard Ordinary Issues in the USA. The 1990-95 table, in addition to being a much more recent table, was based on data where the total

dollar amount of exposure was \$4.1 trillion for males, and \$1.6 trillion for females (more than double that of the earlier 1975-80 table and hence should have greater credibility). It should be noted that the 1990-95 table was developed with selection factors for 25 years with an emphasis of fit over smoothness, while the 1975-80 table was developed with selection factors for 15 years with an emphasis of smoothness over fit.

Companies with relatively low average issue ages (e.g., issue ages 25 - 45) that are still using the 1975-80 Select and Ultimate Mortality Table, should be especially careful in setting their mortality assumptions. If actual mortality turns out to be better reflected by the 1990-95 table (which is very likely), they run the risk of significantly understating future claims.

Certain state regulations dealing with self-support testing and Valuation (e.g. Regulation XXX) prohibit the use of mortality improvement factors prospectively. Since we have shown that using the 1975-80 mortality table is often similar (in slope) to using the 1990-95 table with aggressive mortality improvement factors, it is not unlikely that State Regulators may soon consider the need to require the use of the 1990-95 mortality table or a modification thereof—perhaps the 2001 VBT table.

Based on a recent survey conducted by Tillinghast-Towers Perrin (The 2000 Pricing Survey of Individual Life and Annuity Products) covering 22 mutual companies and 38 stock companies, very few companies include future mortality improvement when calculating expected mortality in product pricing. Therefore, since companies in general believe it prudent not to reflect future mortality improvement it is especially important that they fully analyze their choice in selecting

the underlying mortality table used in their profit studies and mortality projections. In addition, adjustments and modifications to existing tables may be necessary (e.g. there is an AIDS “hump” in young male middle duration mortality reflected in the 1990-95 mortality table, which is probably inappropriate in today's climate of fluid-tested underwriting).

Many companies (direct writers as well as reinsurers), in order to meet competition, have reduced profit margins. Some may have even liberalized (lowered) their mortality assumptions to offset this reduction to profit margin. This increases the likelihood of adverse mortality deviations. In this business environment, the additional vulnerability caused by using a possibly inappropriate mortality table becomes untenable.

Mortality studies are becoming less and less rigorous because it is more difficult to get credible experience. This results from the fact that over recent years, new underwriting requirements and many differentiated risk classifications have emerged (preferred, super-preferred, preferred-plus, etc). In addition this paper suggests the selection of the proper mortality table is yet another variable requiring judgment. In this climate greater emphasis must therefore be placed on subjective judgment rather than stringent statistical techniques, thereby substantiating our earlier comment that projecting mortality is clearly an art, as well as a science.

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# Life Reinsurance From The Munich American Survey

by James L. Sweeney and David M. Bruggeman

**DISCLAIMER:**

*Munich American Reassurance Company prepared the survey at the request of the Society of Actuaries Reinsurance Section as a service to Section members. The contributing companies provide the numbers in response to the survey. These numbers are not audited and Munich American, the Society of Actuaries and the Reinsurance Section take no responsibility for the accuracy of the figures.*

**M**unich American's annual survey, which is conducted on behalf of the Statistical Research Committee of the Reinsurance Section, covers Canadian and U.S. ordinary and group life reinsurance new business production and in force. The ordinary numbers are further subdivided into:

- (1) Recurring reinsurance<sup>1</sup>: conventional reinsurance covering an insurance policy with an issue

date in the year in which it was reinsured

- (2) Portfolio reinsurance: reinsurance covering an insurance policy with an issue date in a year prior to the year in which it was reinsured, or financial reinsurance, and
- (3) Retrocession reinsurance: reinsurance not directly written by the ceding company.

Complete survey results are available from the authors upon request. These results may also be obtained at Munich American's Web site: [www.marclife.com](http://www.marclife.com) look under Research.

## Life Reinsurance Production

At first glance, it may appear that life reinsurance production in 2001

continued the recent trend of growth—after all, looking at the totals summarized below, a healthy 31.0% increase was reported (U.S.: 30.0%, Canada: 47.9%). However, if we dig a little deeper into the numbers, we see quite a different picture. The impact the Swiss Re acquisition of Lincoln Re had on the 2001 results was very significant. If we exclude the Swiss Re portfolio business attributable to the Lincoln Re purchase, we see that in the U.S., every reinsurance category except group experienced a decrease in production. This is quite a contrast to the Canadian numbers which had double-digit increases in every reinsurance category. Excluding the Lincoln portfolio business, the 31.0% overall increase becomes a 7.4% decrease (US: -8.8, Canada: 17.6%).

Below are the life reinsurance production results for 2000 and 2001:

| Life Reinsurance New Business Production (\$U.S. Millions) |                 |                  |              |               |                |              |                  |                  |              |
|--|-----------------|------------------|--------------|---------------|----------------|--------------|------------------|------------------|--------------|
|  | United States   |                  |              | Canadian      |                |              | Total            |                  |              |
|  | 2000            | 2001             | Change       | 2000          | 2001           | Change       | 2000             | 2001             | Change       |
| Ordinary Life  |                 |                  |              |               |                |              |                  |                  |              |
| Recurring  | 985,466         | 933,101          | -5.3%        | 51,827        | 59,177         | 14.2%        | 1,037,293        | 992,278          | -4.3%        |
| Portfolio  | 157,394         | 569,066          | 261.6%       | 12,218        | 35,353         | 189.4%       | 169,612          | 604,419          | 256.4%       |
| Retrocession   | 47,519          | 25,141           | -47.1%       | 736           | 1,431          | 94.4%        | 48,255           | 26,572           | -44.9%       |
| Total Ordinary   | 1,190,379       | 1,527,308        | 28.3%        | 64,781        | 95,961         | 48.1%        | 1,255,160        | 1,623,269        | 29.3%        |
| Total Group  | 20,430          | 46,767           | 128.9%       | 4,103         | 5,930          | 44.5%        | 24,533           | 52,697           | 114.8%       |
| <b>Total Life</b>  | <b>1,210,80</b> | <b>1,574,075</b> | <b>30.0%</b> | <b>66,884</b> | <b>101,891</b> | <b>47.9%</b> | <b>1,279,693</b> | <b>1,675,966</b> | <b>31.0%</b> |

<sup>1</sup> Included in the definition of recurring category is business assumed from the direct side of companies that also have a reinsurance division. Business assumed from the reinsurance division would fall under the retrocession category.

## Recurring Business

Because the survey attempts to remove any double counting of retrocession and block reinsurance from the recurring figures, recurring business usually offers the most revealing picture of production trends. In the U.S., there was a 5.3% decrease in recurring new business in 2001. This is a rather noteworthy event as it marks the first time since 1989 that recurring business decreased in the U.S. To put this in perspective, increases of 21.6%, 19.3%, 33.9%, and 44.8% were recorded in 2000, 1999, 1998 and 1997 respectively. Unlike the U.S., Canadian recurring business continued to grow in 2001. A 14.2% growth rate was recorded. This follows increases of

41.7% in 2000, 37.1% in 1999 and confirms the belief that Canadian direct writers are reinsuring more business on a first dollar quota share basis. Two other factors believed to have contributed positively to the Canadian results are: (1) some Canadian direct writers have lowered their maximum retention limits, and (2) an increase in high net worth sales in Canada.

While the overall recurring market decreased, there were still some companies that reported noteworthy increases. Having purchased Lincoln Re in 2001, Swiss Re reported an increase of \$127.5 billion in U.S. and Canadian recurring business. Annuity & Life Re and Scottish

Re, relative newcomers to the reinsurance industry, also reported impressive increases. Annuity & Life Re experienced a \$23.5 billion growth in recurring production, while Scottish Re reported a \$21.0 billion increase. Other companies reporting incremental increases in excess of \$5 billion in 2001 include: ING Re (\$7.6), Canada Life (\$7.5) and BMA (\$6.0).

Totals for Canadian and U.S. recurring ordinary reinsurance assumed in 2000 and 2001, as well as percentage changes, are listed below and on page 30.

## Portfolio and Retrocession Business

Total portfolio business increased over 256% in 2001. However, as

### U.S. Ordinary Recurring Reinsurance (U.S. Millions)

| Company             | Assumed Business | 2000 Market Share | Increase in Production | Assumed Business | 2001 Market Share | Increase in Production |
|---------------------|------------------|-------------------|------------------------|------------------|-------------------|------------------------|
| Allianz             | 45,532           | 4.6%              | 27.0%                  | 43,711           | 4.7%              | -4.0%                  |
| Annuity and Life Re | 32,253           | 3.3%              | 102.4%                 | 55,764           | 6.0%              | 72.9%                  |
| AUL                 | 46,942           | 4.8%              | 11.4%                  | 21,750           | 2.3%              | -53.7%                 |
| BMA                 | 33,004           | 3.3%              | 30.9%                  | 39,003           | 4.2%              | 18.2%                  |
| Canada Life         | 11,471           | 1.2%              | 20.8%                  | 19,010           | 2.0%              | 65.7%                  |
| Employers/ERC       | 86,577           | 8.8%              | -4.1%                  | 37,248           | 4.0%              | -57.0%                 |
| General & Cologne   | 20,305           | 2.1%              | -1.8%                  | 16,231           | 1.7%              | -20.1%                 |
| Gerling Global      | 31,397           | 3.2%              | 19.3%                  | 27,746           | 3.0%              | -11.6%                 |
| Hannover Life Re    | 6,381            | 0.6%              | 59.9%                  | 3,155            | 0.3%              | -50.6%                 |
| ING Re              | 86,009           | 8.7%              | 54.0%                  | 93,584           | 10.0%             | 8.8%                   |
| Lincoln Re *        | 134,393          | 13.6%             | 17.1%                  | ACQ              | ACQ               | ACQ                    |
| Munich American Re  | 119,859          | 12.2%             | 168.8%                 | 103,679          | 11.1%             | -13.5%                 |
| Optimum Re (U.S.)   | 1,069            | 0.1%              | -1.3%                  | 1,301            | 0.1%              | 21.7%                  |
| RGA                 | 119,449          | 12.1%             | 36.6%                  | 112,746          | 12.1%             | -5.6%                  |
| SCOR Life Re        | 844              | 0.1%              | 44.8%                  | DNR              | DNR               | DNR                    |
| Scottish Re         | 5,060            | 0.5%              | 100.0%                 | 26,045           | 2.8%              | 414.7%                 |
| Swiss Re            | 124,176          | 12.6%             | -2.3%                  | 246,466          | 26.4%             | 98.5%                  |
| Transamerica Re     | 80,741           | 8.2%              | 7.7%                   | 85,662           | 9.2%              | 6.1%                   |
| <b>Totals</b>       | <b>985,462</b>   | <b>100.0%</b>     | <b>26.9%</b>           | <b>933,101</b>   | <b>100.0%</b>     | <b>-5.3%</b>           |

\* Lincoln Re acquired by Swiss Re

## Life Reinsurance Data ...

from page 29

| Canadian Ordinary Recurring Reinsurance (U.S. Millions) |                  |                   |                        |                  |                   |                        |
|---|------------------|-------------------|------------------------|------------------|-------------------|------------------------|
| Company   | Assumed Business | 2000 Market Share | Increase in Production | Assumed Business | 2001 Market Share | Increase in Production |
| Annuity and Life Re                                     | 144              | 0.3%              | -93.4%                 | 0                | 0.0%              | -100.0%                |
| Canada Life   | 0                | 0.0%              | -100.0%                | 461              | 0.8%              | 100.0%                 |
| ERC Canada  | 3,796            | 7.3%              | 137.2%                 | 7,386            | 12.5%             | 94.6%                  |
| General & Cologne                                       | 6                | 0.0%              | 500.0%                 | 41               | 0.1%              | 583.3%                 |
| Gerling Global  | 1,563            | 3.0%              | 22,214.3%              | 2,094            | 3.5%              | 34.1%                  |
| ING Re  | 2                | 0.0%              | -50.0%                 | 1                | 0.0%              | -50.0%                 |
| Lincoln Re *  | 6,063            | 11.7%             | 53.1%                  | ACQ              | ACQ               | ACQ                    |
| Munich re (Canada)                                      | 16,599           | 32.0%             | 63.0%                  | 20,950           | 35.4%             | 26.2%                  |
| Optimum Re (Canada)                                     | 1,382            | 2.7%              | 67.4%                  | 1,290            | 2.2%              | -6.7%                  |
| RGA   | 2                | 0.0%              | 100.0%                 | 0                | 0.0%              | -100.0%                |
| RGA Re (Canada)   | 8,439            | 16.3%             | 3.6%                   | 7,919            | 13.4%             | -6.2%                  |
| Swiss Re  | 13,832           | 26.7%             | 42.6%                  | 19,036           | 32.2%             | 37.6%                  |
| <b>Totals</b>   | <b>51,827</b>    | <b>100.0%</b>     | <b>41.6%</b>           | <b>59,177</b>    | <b>100.0%</b>     | <b>14.2%</b>           |

\* Lincoln Re acquired by Swiss Re

.....

noted earlier, this figure is heavily impacted by Swiss Re's acquisition of Lincoln Re. If we extract the portfolio business attributed to this deal, we see that portfolio business decreased 33.1%. Over the last few years, there has been a decreasing trend in portfolio business. This trend would support the view that the number of in force block deals being offered to reinsurers has been declining.

Meanwhile, retrocession production dropped 44.9% in 2001. In just the last two years, retrocession production has fallen over 67%. Factors that may be contributing to the drop in production are: (1) larger reinsurers increasing their retention; (2) the trend toward first dollar quota share arrangements with multiple reinsurers in reinsurance pools—which reduces the availability of “excess” layers; (3) consolidation of the reinsurance market.

### Comparison With Direct Market

Preliminary estimates from the American Council of Life Insurance (ACLI) show 2001 U.S. ordinary individual life insurance purchases to be at almost exactly the same level as 2000 purchases. A modest 0.3% increase is estimated.

Most direct writers continue to reinsure on a first dollar quota share basis. However, if we compare life purchases data from the ACLI to the reinsurance survey production numbers, we see that 2001 is the first year since 1989 where a decrease in the percentage-reinsured was recorded. Given that results from the last four years (1998-2001) show a relatively stable percentage-reinsured level (in the mid-to-upper 50% range), the percentage-reinsured level has definitely hit a plateau, and maybe even reached its limit. The decrease in the percentage-reinsured in 2001 may suggest that direct writers are either slowly moving away from first dollar quota share arrangements and back to

excess retention arrangements or are increasing their maximum retention limits on first dollar quota share arrangements.

The following graph on page 31 compares ordinary life new business totals with the recurring life reinsurance totals for the United States.

### Life Reinsurance In Force

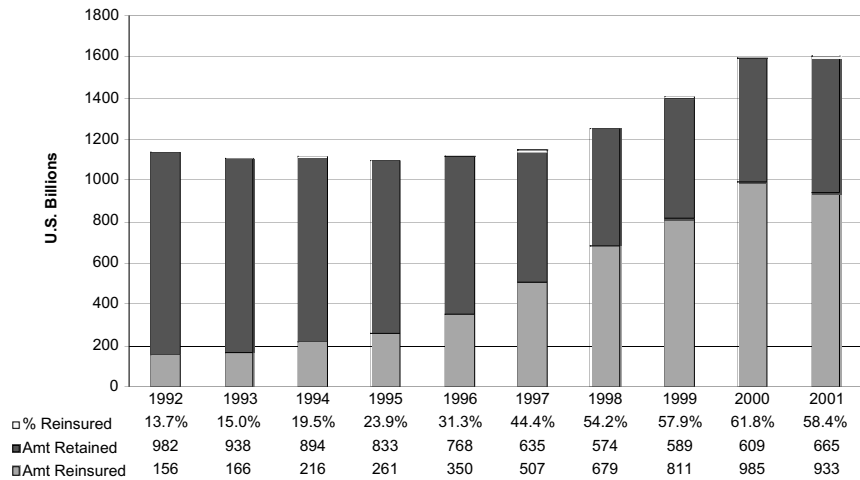
With increases in both U.S. and Canadian life reinsurance in force reported, total life in force business increased 15.1% in 2001. Excluding the Lincoln Re portfolio business from Swiss Re reduces this increase to 3.6%. This compares to increases of 21.6% in 2000 and 19.4% in 1999. The U.S. total life in force increased 15.1% (3.3% excluding the Lincoln Re portfolio business) and the Canadian market in force grew by 15.0% (7.4% excluding the Lincoln Re portfolio business) in 2001.

The in force survey results for 2000 and 2001 are summarized on page 31.

**Conclusion**

Has the U.S. reinsurance market peaked? Will the industry look back at the tremendous growth which occurred in 1990s and say “Those were the good old days?” While a few more years of experience is needed to answer these questions, the 2001 results do raise some concerns. First, U.S. recurring business reported a decrease in production for the first time in 12 years. Second, the percentage-reinsured is estimated to have decreased for the first time in 12 years. Third, retrocession business

**U.S. Ordinary Individual Life Insurance Sales**



**Life Reinsurance In Force (\$U.S. Millions)**

|                   | United States    |                  |              | Canadian       |                |              | Total            |                  |              |
|-------------------|------------------|------------------|--------------|----------------|----------------|--------------|------------------|------------------|--------------|
|                   | 2000             | 2001             | Change       | 2000           | 2001           | Change       | 2000             | 2001             | Change       |
| Ordinary Life     |                  |                  |              |                |                |              |                  |                  |              |
| Recurring         | 3,274,158        | 3,350,669        | 2.3%         | 200,377        | 224,427        | 12.0%        | 3,474,535        | 3,575,096        | 2.9%         |
| Portfolio         | 364,337          | 864,448          | 137.3%       | 35,616         | 62,263         | 74.8%        | 399,953          | 926,711          | 131.7%       |
| Retrocession      | 253,442          | 245,761          | -3.0%        | 10,465         | 10,844         | 3.6%         | 263,907          | 256,605          | -2.8%        |
| Total Ordinary    | 3,891,937        | 4,460,878        | 14.6%        | 246,458        | 297,534        | 20.7%        | 4,138,395        | 4,758,412        | 15.0%        |
| Total Group       | 110,737          | 144,391          | 30.4%        | 28,559         | 18,720         | -34.5%       | 139,296          | 163,111          | 17.1%        |
| <b>Total Life</b> | <b>4,002,674</b> | <b>4,605,269</b> | <b>15.1%</b> | <b>275,017</b> | <b>316,254</b> | <b>15.0%</b> | <b>4,277,691</b> | <b>4,921,523</b> | <b>15.1%</b> |

continued its steady decline in production. On a more positive note, the Canadian reinsurance market continues to produce double-digit growth, thanks in large part to the prevalence of first dollar quota share arrangements. However, one has to wonder if future growth trends in Canada will mirror those witnessed in the U.S. market.

Experts are predicting continued consolidation within the reinsurance industry over the next several years. To date, the consolidation effort has radically changed the make-up of the market. To illus-

trate, Fitch Ratings recently reported that in the past six years, nine of the top 18 life reinsurers have been acquired. This consolidation has resulted in the top five life reinsurers accounting for almost 70% of the new life recurring business in 2001.

In addition to the challenges above, reinsurers will continue to deal with the Regulation XXX capital requirements, and perhaps even a new valuation table. The impact the new valuation table will have on direct sales, and consequently reinsurance production, will be watched very closely.

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