Will Your Next Reserve Increase Be Your Last?

"The arithmetic makes it plain that inflation is a far more devastating tax than anything that has been enacted by our legislature. The inflation tax has a fantastic ability to simply consume capital."

—Warren Buffett

WHEN ONGOING RESERVE STRENGTHENING becomes common practice, it's time to look beyond adverse development for the hidden enemies of essential actuarial forecasting.

One such subtle and destructive creature lurks beyond the detection of standard models and has disturbed and destroyed insurers in the United States and abroad. But thanks to new actuarial modeling, this often underestimated foe—known as an unrecognized inflationary trend—can be detected and addressed.

This is good news for CEOs and CFOs because unrecognized inflationary trends can eat away at precious reserve margins, which leaves insurers vulnerable to insolvency. Moreover, the term *adverse development* is often misused to mean repeated increases due to trends that could have been recognized when it should refer to development that is higher than expected due to random fluctuations.

The Nemesis of Reserving

Unrecognized inflationary trends dangerously consume capital exponentially. While economic inflation is generally obvious, "superimposed" or "social" inflation, which rides above and beyond economic inflation, can go unrecognized for many years.

This overlooked and critical characteristic often leads to chronic and massive under-reserving and under-pricing. More important, we believe unrecognized inflationary trends have been a principal driver of the collapse of many insurers.

After analyzing data from many companies in the United States and abroad, we're amazed at how often we find stable and unrecognized inflationary trends that have been in effect for five to 10 years or longer. Without annual reserving and pricing adjustments, it's easy to see how companies can crumble under the weight of this invisible pressure.

Yet even though these high inflation rates have been in the business for many years, insurers often fail to see them until it's too late. The reason is simple: The standard actuarial models for property/casualty loss reserving fail to adequately assess and adjust for inflation rates. Even worse, the evidence suggests that many of these insurers failed because they didn't move beyond the traditional slide-rule-era models.

The good news is insurance carriers no longer need to be saddled with undetected inflationary trends. That's because much more information can be extracted from historical data using new statistical modeling techniques that provide a quantified risk assessment. These new techniques are based on multidimensional modeling. So, instead of looking at one (or two) dimension(s)—payments depending on development period (and sometimes accident period)—we can use both and add the critical third dimension—the calendar period. It's here we see inflation at work.

When inflation moves in harmony with interest rates, companies can insulate themselves from adverse results by matching the duration of assets with their liabilities (See, for example, Butsic, Robert P., "The Effect of Inflation on Losses and Premiums for Property-Liability Insurers," Casualty Actuarial Society Discussion Paper Program, May 1981, pp. 58-102.). Unfortunately, superimposed inflation rarely moves in harmony with interest rates; the level of inflation experienced by one company can be very different from that experienced by another. Therefore, it's essential that you extract all the information you can from your own data.

Further, inflation changes don't move solely in one direction. Undetected increases in inflation can lead to under-pricing, under-reserving, and insolvency. Meanwhile, undetected declines in inflation can lead to missed fi-

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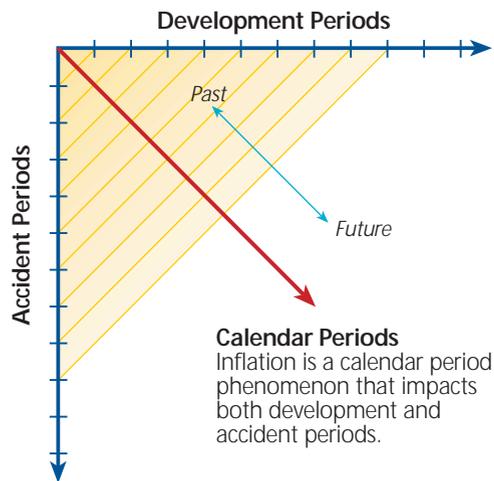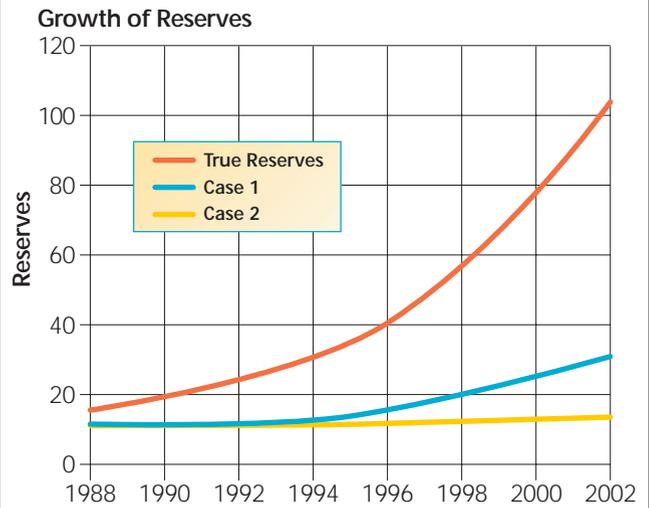
Impact of Inflation on Different Time Periods

Development Periods

Past

Future

Accident Periods

Calendar Periods
Inflation is a calendar period phenomenon that impacts both development and accident periods.

Jump from 4 Percent to 15 Percent Inflation Produces Chronic Under-Reserving

Growth of Reserves

True Reserves
Case 1
Case 2

Reserves

nancial opportunities. Modern technology, not slide-rule-age techniques, can help you detect these critical changes.

To begin evaluating how inflation is affecting your business, consider:

- What is the level of inflation?
- Is it stable or fluctuating?
- If it's stable, how long has it been stable?

The answers will help you determine reasonable expectations for future inflation and, in turn, realize the best business decisions.

A Key Indicator

One statistic that can give management an indication of the extent of under-reserving is the ratio of total liabilities, T, to current liabilities, C. (Current liabilities are liabilities to be paid during the next 12 months.) Using this statistic, a short-tailed line will have a low ratio; say 1.5 or less, while a long-tail line will have a high ratio, perhaps 5 or higher, even in cases where the liabilities are discounted.

Let's assume for now that your balance sheet is an accurate reflection of true liabilities. How would we expect T/C to behave? Many characteristics can affect the ratio T/C, but the two main drivers are superimposed inflation and the rate of decay.

Superimposed inflation has the great-est impact on the ratio T/C because as inflation increases, T/C increases. All the paid losses going forward increase exponentially. Note that inflation affects *all* the underwriting years, including all the *prior* years that are still running off and *future* underwriting years.

Both the current liabilities C and the total liabilities T should increase from year to year by (at least) the inflation rate. However, inflation has a devastating effect on T (see example above). While this characteristic is more devastating for long-tail lines, it can also be found in short-tail lines.

The rate of decay (in standard actuarial parlance, this would be equivalent to the link ratios decreasing to 1.00) is a measure of how fast the *incremental* claim payments decrease to zero over time. The rate of decay thus reflects the length of the tail of the liabilities and affects the ratio T/C. As the rate of decay declines, the tail lengthens. Therefore, the ratio T/C increases.

Inflation Gobbles Capital

But what if your balance sheet is not an accurate reflection of true liabilities? Suppose you did a review of prior balance sheets and found under-forecasting of current liabilities for a number of years. Let's say you found that true current liabilities

were 5 percent higher in 1999 than the value contained in the 1998 balance sheet; in 2000 they were 10 percent higher; and in 2001 they were 15 percent higher.

In this case, it's very likely you're experiencing an inflationary trend that standard models haven't recognized. With each year, the gap between true liabilities and your balance sheet reserves has been widening.

If your company was estimating the T/C ratio at 2.5, but the true ratio is 5.0, your firm could be in trouble. With some typical rates of decay, it's easy to show that your reserves might be deficient by 57 percent. Unless your company has surplus in excess of 1.3 times the total liabilities in the 2001 balance sheet, it may be insolvent.

The Wrong Move

A tempting option is to slow payments to reduce the value of C in the next balance sheet and leave the reserves T alone. This will raise the ratio T/C to 5.0, so everything can appear to be fine. But next year we find those liabilities remained and the company has paid out even more than the previous year. Now the gap between C_{held} and the true payment C_{true} is even wider—making the under-reserving even worse.

Another option is simply to increase

current reserves—i.e., set $C_{held} = C_{true}$. Unfortunately, the liabilities for the remaining years have a multiplicative impact on the total liabilities, so getting C right is only part of the picture.

The only solution is a sufficient increase in total reserves T to get the balance sheet ratio T/C in line with the best estimate. It's likely that rate increases or other management action will also be necessary.

What Might Happen

If superimposed inflation has gone unrecognized for a number of years, its exponential effect on liabilities may make it almost impossible to prevent an insurer's collapse.

A typical scenario follows: In a workers' compensation portfolio, general inflation is running at 4 percent per annum. In 1988, superimposed inflation kicks in at 11 percent—with total inflation at 15 percent—and stays at that rate until the present. With some typical values for the rate of decay, the true ratio has increased from 3.0 to 3.8. To keep this simple, we assume the company continues to write this business at about the same level of exposure.

What might happen? Let's look at two possibilities:

Case 1: The company continues to assume that inflation is 4 percent per annum.

Case 2: The company continues to assume that inflation is 4 percent per annum until 1996, when it increases the rate of inflation to 15 percent.

Each year the true value of the current liabilities C_{true} will grow exponentially based on the 15 percent inflation rate, and so will the total liabilities T_{true}. In Case 1, the balance sheet reserves, C_{held} and T_{held}, will also grow exponentially but based on an inflation rate of 4 percent. The gap between the two reserve positions increases almost exponentially as time goes on (see Fig. 2). Each year the company will find its forecast of current liabilities C_{held} is inadequate.

At first, the company is cash flow positive as it collects premiums at the beginning of each underwriting year, while not paying claims until much later. The cash crunch eventually comes because C_{true} grows exponentially, the premiums don't grow fast enough, and each year the held reserves are much less than they should be.

Even in Case 2, where from 1996 the company increases C_{held} and T_{held} by 15 percent each year, it will continue to be under-reserved by a factor of three. This is because C_{true} and T_{true} are also increasing each year by 15 percent. Although the company's reserves and premiums are now increasing at the same rate, they'll never catch up. The crunch has been delayed, but it's still inevitable.

The Challenge

While a jump to 15 percent inflation won't happen for all segments and all companies, it can occur for one or more of your segments, and the result will be just as devastating. If you've started on the pattern of repeated reserve strengthening, the crucial questions are: Have the recent increases been sufficient to get your company on the actual curve of its true liabilities? Or, has it merely adjusted the trend, leaving the gap between stated reserves and true liabilities still wide and leading to eventual failure?

To answer those questions, you need to start analyzing your historical data in a way that gives you valid estimates of the level of superimposed inflation. Modern statistical models can warn of problems much earlier, which allows management to gain a deeper understanding of their business and make competitive decisions before it's too late.

The challenge for actuaries, who now have the power to find these hidden enemies, is to advise management to act quickly. Such action will protect individual insurers and lead to a healthier industry. •