

Time diversification and effective risk management



With the volatility of natural catastrophes, insurers need to diversify their risks not only in terms of place and type but also time. For time diversification, the difficulty is the regulators' concern over diversified equalisation reserves, resulting in its prohibition.

Dr Michel Dacorogna of **SCOR SE** shows the benefit of having these reserves and how insurers can allay regulators' concerns.

The last decade had seen a series of important natural catastrophes that plagued the insurance industry. While no insurer can predict natural disasters and it was unusual that two bad years, like 2004 and 2005, occurred back-to-back, it is well within the range of commercially-available model scenarios. Insurers can model catastrophes for their frequency, their severity or their geographical range – but they cannot say when they might happen.

With high frequency-low impact events, thanks to the law of large numbers, they are relatively straightforward to forecast. The number of thefts, accidents or fires in any particular country over a year can be predicted to fall within a relatively small range. An insurer can set aside sufficient reserves to cover expected losses for a distinct time period with a reasonably high level of confidence.

Need to diversify risk in terms of place, type and also time

For natural catastrophes, an insurer can try and spread the risk by writing policies over a large geographic area. That does not however prevent a windstorm in Europe, an earthquake in Turkey, a typhoon in Japan and a hurricane in US all occurring in the same year.

To cover catastrophe losses, insurers need to look outside the contract period; they need to diversify their risk not only in terms of place and type, they also need to diversify in time.

Over a 100-year period, an insurer can make calls with some confidence as to how many windstorms might pass over a certain area, and the range in which subsequent losses might be expected. Assessments of expected annual loss on natural catastrophe lines can only be undertaken over an extended time period.

The only means for an insurer to diversify over time is to set aside reserves in years of losses below expectation – or equalisation reserves – to cover for losses in years above expectation. This technique was fundamental to Swiss Re establishing its global identity, when it was able to meet its obligations following the 1906 San Francisco earthquake. European (re)insurers have been practising time diversification ever since.

Accounting rules and equalisation reserves

Theoretically time diversification for insurers should be easy. Excess reserves from a good year are put aside to cover losses in a bad year.

However regulators have not always seen it as such. Defining in the books where equalisation reserves begin and end has been no straightforward matter. There has been no standardised accounting procedure relating to book equalisation reserves. Moreover, there is no standardised treatment of equalisation reserves: whom they actually belong to; what their taxable status is; how they should be valued in annual accounts; or whether it is legitimate for funds to be injected or withdrawn from the reserves for non-natural catastrophe reasons.

There is confusion amongst shareholders and regulators, because they are looking at it from the outside, as to what exactly constitutes equalisation reserves between different companies and different countries. Not knowing exactly what reserves are allocated to where can give rise to what is referred to in the literature as agency risk.

Leaving not-clearly designated cash balances with managers may see the misuse of what should be equalisation reserves. Balance sheets could be improperly improved; losses elsewhere in the business can be hidden. Moreover reserves are not taxable, whereas profits are – on paper a further incentive for regulators to squeeze what might be regarded as excessive reserve levels.

Reserves not used are given back to shareholders

Accounting regulations like US-GAAP or IFRS state that in order to prevent managers misusing cash balances, any reserves that are not required over the course of a given period – generally over an accounting year – should be repatriated to shareholders.

Shareholders have ultimately taken the risk, and they should reap the benefits. The repatriation of reserves over the time span of a year prevents an insurer from putting aside funds from a low-loss natural catastrophe year to cover for a higher-loss year. Because of the fear of agency risk, they prohibit insurers from practising time diversification.

Without reserves, insurers need to raise funds in loss year

Agency risk advocates recognise that natural catastrophes will on occasion cause losses in excess of existing reserves. Their answer is to tap the capital markets for the required shortfall. The difficulty for insurers is the cost of capital. Raising extra capital – potentially hundreds of millions of dollars – is considerably more expensive than holding cash on the balance sheet. Investment



banks administer such services at considerable cost.

Moreover if an insurer has to raise funds as a result of a single event, there is the distinct likelihood that other insurers have taken losses from that event, driving up aggregate demand (and subsequent cost) of capital. Such pressures are accentuated by the cyclical nature of pricing structures in the industry.

Expectations of a hardening market following a major catastrophe – and the need to take advantage of that hardening market – cause a further rise in aggregate capital demand. It is not just cost which makes recapitalisation difficult; logistically recapitalisation is difficult, particularly to cover a large loss. The potential damage to reputation is considerable, particularly given rating agency scrutiny of capital raising activity. Losing a rating whilst raising capital will inevitably reduce business, possibly to a large degree.

Shareholder benefit

There is however evidence that time diversification reserves over the longer term – rather than repatriating reserves annually to shareholders – is actually to the benefit of shareholders.

We simulated a model of two insurers, one practising time diversification, where the funds equal to the gap between expected losses and actual losses were retained, and one repatriating all natural catastrophe reserves not used over the year to its shareholders (as with US-GAAP or IFRS legislation).

We decided to test the hypothesis of the improved shareholder value of time diversification against a stochastic model, using a Monte Carlo simulation to replicate 10,000 potential scenarios spread over a 30-year period (see reference below).

Both companies incurred the same losses over the period, with the time diversified company retaining premiums above actual losses, with reserves redistributed at the end of the 30 years, and the US-GAAP company redistributing excess reserves annually. The vast majority of our simulations gave a better Sharpe ratio to the time diversified insurer than the US-GAAP equivalent. Most of those cases with a better Sharpe ratio under US-GAAP were bankruptcy scenarios early in the 30 year cycle, as the benefits of time diversification had not had time to take effect. The Sharpe ratio is in effect stating that, because of reduced volatility, cash flows related to catastrophe lines are improved under time diversification.

Moreover we can value that cash flow on a mark-to-market basis. Using an interpretation of Merton's model, if the value of our line of business is regarded as equity plus liability (or potential catastrophe losses), we can regard a call option of the expected cash flows of the company as the value of the shares of the company. We thus have a means of providing a market valuation of our equalisation reserves for both companies. Such a valuation clearly indicates that the long-term investor will get more value from the time diversified company than from the US-GAAP company.

Controlling agency risk

Whilst our studies indicated that shareholders clearly benefit

from time diversification practices, they did not include the chief concern of US-GAAP advocates – that of agency risk.

The potential solution to such a concern is to clearly classify what constitutes equalisation reserves. This is done by the insurer defining what it expects its natural catastrophe losses to be over a given year. It is the key difference between the potential future use of equalisation reserves, and the practice as undertaken hitherto.

Modelling techniques, whilst not without criticism, have developed to a sufficient level whereby an insurer should be able to provide a figure with an expected loss over the coming period. Where previously there may have been some fuzziness, differentiating distinctly between expected and actual losses clearly encapsulates what belongs in equalisation reserves.

As in the model, at the end of any extended period – say 10 years – equalisation reserves attributable to year 1 of the period can be repatriated to shareholders. Thus the status and ultimate ownership of the equalisation funds can be clearly allocated. Agency risk is effectively sidelined.

Clearly, equalisation reserves not only answers concerns regarding agency risk – they should also clarify the status of such reserves for both tax and accountancy purposes. If equalisation reserves are returned to shareholders at the end of an extended period, they can be treated as dividends. We calculate there will be little material difference in overall taxable returns over the longer term between a time diversified and a US-GAAP insurer. Time diversification is a tax-neutral practice.

Conclusion

Equalisation reserves not only benefit the shareholder, they benefit wider supply side insurance provision. The greatest single risk to the industry stems from natural catastrophes. The lack of smoothing effects of time diversification will, to a greater or lesser degree, lead to greater volatility, and more industry risk. More industry risk will lead to capacity restrictions, higher premiums, and to geographic areas that may struggle to find private sector insurance coverage at all. Good and affordable insurance cover is in the interest of all stakeholder parties, not just the insurer and its shareholders.

Time diversified equalisation reserves are a potentially valuable risk management tool (amongst others) for insurers. Our studies have clearly demonstrated the cash flow benefits of time diversification to the long term investor, as well as giving cash flow liabilities a market value.

We accept the concerns of those who see the dangers in agency risk – however, with the clear statement of anticipated losses, it is possible to clearly isolate equalisation reserves. We hope to contribute towards a reopening of the debate on time diversification, and look forward to the comments of others.▲

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The IRFRC was established in 2011 to produce research and extend the dialogue on insurance and insurance-related risk in the Asia-Pacific region. The ideas expressed in this article present the views of the named researchers. For more information, see irfrc.com.

Reference

M. Dacorogna, H.J. Albrecher, M. Moller and S. Sahiti, Equalization reserves for natural catastrophes and shareholder's value: a simulation study, 2013, European Actuarial Journal, vol. 3 (1) , page 1-21