



Solvency of non-life insurers:
Balancing security and
profitability expectations

Report by Swiss Re

The activities of insurance companies throughout the world are subject to supervision in the interest of consumer protection. In the US, Europe and Japan, the deregulation of price and product controls has underlined the importance of minimum solvency margins. The US and Japan have devised similar, complex formulae for calculating the minimum amount of capital funds for insurance companies. These take into account underwriting risk, asset risk and credit risk. In the EU, in contrast, the capital funds required are calculated only on the basis of the underwriting risk. The asset risk is limited by means of investment regulations. to protect the policyholder.

The function of capital funds

An insurer's core activity is the assumption of risks. This is combined with asset management, since the technical reserves, which are funded using advance premium payments and an insurer's own capital funds, are invested to earn interest. The transfer of risk involves an underwriting risk for the insurance company which may call into question the insurer's ability to fulfil its claims payment obligations or to continue its business operations. Investment in income-bearing assets, too, poses risks, which can endanger the existence of an insurer. Capital funds serve as a buffer against any unforeseen fluctuations in results.

What do statistics show as being the main causes of insolvency? Data from A.M.Best on the causes of 683 insolvencies in the US between 1969 and 1998. The most common triggers were insufficient premiums or reserves, rapid growth, and catastrophic events. At least 41% of all insolvencies are attributable to underwriting risks.

Other studies have also confirmed that underwriting risk is the major factor influencing the frequency of insolvencies. There is a connection between insolvencies and the loss ratio of US non-life insurers. It clearly shows that the number of insolvencies tends to rise in years where the loss ratio is high.

A statistical survey of the EU showed that insolvencies and problems have recently occurred both for small, regional insurance companies and for larger companies and groups. A disproportionately large number of new and fast-growing insurers

were affected.³ However, of the twelve insolvencies in France between 1990 and 1998, only one was attributable to rapid growth. Five cases resulted from the foreign parent becoming insolvent. Two insurers became insolvent as a result of fraud, two due to insufficient reserves and one on account of an inadequate reinsurance strategy.

The cost of insolvencies and the significance of state guarantee funds

Several countries have established state guarantee funds to cope with the consequences of insolvencies. The US and the UK have introduced protection schemes for all personal lines of business; in Germany and France, such mechanisms are only in place for motor liability insurance. The following section compares the regulations in the US, the EU and Japan.

Solvency controls in the US, the EU and Japan



Reasons for solvency control

Insolvencies are a normal side effect of competitive markets. The justification for regulatory control rests on consumer protection issues:

- Losses may plunge consumers into severe financial difficulties. This gives rise to a particular need for protection.
- As it is common for current business operations to be financed by advanced premium payments from policyholders, insurers are not subject to supervision by professional creditors or liquid capital markets (as is the case, for example, for bond markets).
- Public sources of information provide insufficient transparency or up-to-date data to allow an insurer's financial situation to be assessed accurately. For the individual policyholders, the effort required to procure and analyze the necessary information is very large. It must normally be assumed, therefore, that policyholders have insufficient information at their disposal. This particularly matters if a guarantee fund is available should something go wrong: the policyholders lose the financial incentive to assess the insurer's ability to pay (phenomenon of moral hazard).
- The existence of a guarantee fund may also generate a moral hazard problem with respect to the insurance company. If insurers' contributions to the fund are not commensurate with their insolvency risk, then insurers are provided with an incentive to accept extremely risky business, since the negative consequences are shared by all insurers.

Comparison of solvency regulations in the US, the EU and Japan

The US and Japan introduced their solvency control in the form of risk-based-capital models in 1994 and 1997, respectively. The RBC system in the US replaced the Insurance Regulatory Information System designed to support the minimum capital requirements in the individual states. In Japan, the risk-based-capital model was introduced following the abolition of price and product controls.

The US and Japan use similar methods to calculate the required capital funds. Both countries use a complex formula which takes account of several risk components, including underwriting risk, asset risk and credit risk. In addition, the US considers the loss reserves risk. Japan also incorporates natural catastrophe and management risks.

In the EU, only the underwriting risk is included in the calculation of capital requirements. The asset risk is limited by means of regulations designed to prevent companies from becoming overly dependent on a particular investment, asset class or region. The lack of asset-risk considerations is one of the main criticisms of the European system. As the example of the US shows, asset risk is of central importance: in 1997, approximately one-quarter of the risk-based capital was generated by asset risk. The advantage of the European system is that it is easier to apply.

One criticism of all three models is that they give insufficient consideration to reinsurance. In the EU, only 50% of reinsurance may be credited. Furthermore, the EU directive disadvantages non-proportional reinsurance in comparison to proportional reinsurance. The EU Commission is currently reviewing how to remedy this and other critical points in the EU's solvency regulations.⁷ In the US, reinsurance is included indirectly by using net values for calculating RBC. None of the three solvency systems takes the reinsurer's financial strength into account.

One criticism of the US model is that insufficient attention is paid to the size of the company when determining minimum capital requirements, although according to the law of large numbers the underwriting risk is larger for smaller companies.

EU legislation also takes only partial account of the size of a company in the calculation of minimum capital requirements. Furthermore, the American and Japanese RBC systems neglect the effective covariance between the risk components.

Insufficient attention is paid to the size of the company. Some empirical studies are rather critical of the ability of the RBC system to detect companies endangered by insolvency. A large number of insolvent companies had an RBC ratio above the critical minimum. More refined models, such as cash-flow models, appear to be better suited to detecting insolvencies than the current RBC model.



A quantitative comparison of both sets of regulations illustrates that the American RBC system enforces higher capital requirements on US insurers than the European system. The simulated European target solvency margin is exceeded more often than the RBC requirements. This may be explained by the explicit inclusion of the asset risk in US capital regulations.

Solvency control in the US

The introduction of the RBC concept in 1994 had the following objectives: (1) closer relation between capital requirements and risk; (2) increase in overall capital requirements in reaction to increased number of insolvencies; (3) standardized regulations in all states; and (4) clearer authority for regulators to intervene.

Solvency control is based on a current/target comparison between the available (adjusted) capital and the required (risk-based) capital on the balance sheet date. All the data used are based on the published annual statements, which means that

the introduction of the RBC concept did not require companies to disclose additional data. The RBC formula is based on the following categories of risk:

R0 Asset risk: guarantees and contingent liabilities from affiliates (determined from their RBC)

R1 Asset risk: fixed-income bonds and short-term investments (calculated by multiplying by the prescribed risk factors)

R2 Asset risk: stocks, real estate and participations (calculated by multiplying assets by the prescribed risk factors)

R3 Credit risk: 50% of RBC of ceded reinsurance and other receivables (calculated by multiplying receivables by the prescribed risk factors)

R4 Loss reserves risk (calculated by multiplying the reserves with the prescribed risk factors) + R3

R5 Written premium risk (determined from the company's average loss ratio and market loss ratio)

Off-balance-sheet risks are split into various groups. Non-controlled assets, guarantees for affiliates and contingent liabilities are included in R0. Risks from strong company growth are divided into requirements relating to loss reserve growth in R4

and premium growth in R5. The overall RBC is then determined in accordance with the formula given below. A general reduction is used to compensate for the fact that the various risk categories partially offset one another. However, no attempt is made to quantify or take account of the effective correlation between the various risk groups.

Total RBC = R0 + Square root of (R1² + R2² + R3² + R4² + R5²).

Approximately two-thirds of the RBC is thus determined, either directly or indirectly, by the underwriting risk. Investments in equities, which have grown rapidly in recent years, contributed approximately one-quarter of RBC (part of R0 consists indirectly of the shares risks of subsidiaries).

The regulatory authorities can intervene if various, critical values in the RBC ratio are not fulfilled. The RBC ratio is defined as the ratio of total adjusted capital to the capital amount, which would trigger the right for the authorities to intervene

(the so-called authorized control level). This value is 50% of the total RBC. The regulatory bodies can intervene in the following instances:

RBC ratio >200%: Capital requirements are fulfilled.

RBC ratio <200%: Insurer must file a plan with proposals to correct financial problems (company action level).

RBC ratio <150%: The commissioner can perform such analyses and institute such corrective action as deemed appropriate (regulatory action level).

RBC ratio <100%: The commissioner has the legal grounds to rehabilitate or liquidate the company (authorized control level).

RBC ratio <70%: The commissioner is required to seize the company for rehabilitation or liquidation (mandatory control level).



Development of risk-based capital

The average solvency ratio rose from 72% to 103% between 1994 and 1998. At the same time, the target solvency margin of US insurers also climbed. The ratio of RBC to net premiums jumped between 1994 and 1996, and then leveled off. This was largely due to the increase in asset risk. The ratio of shares to total invested assets rose from 17% to 23%. The asset risk from shares in relation to premium volume increased from 40% to 62%. Approximately two-thirds of the RBC increase can be attributed to the higher asset risk. This clearly illustrates the effect that the asset risk from shares has on RBC (approximately one quarter of the total RBC).

Solvency control in the EU

whereby insurers are required to keep capital funds of at least the same amount as the so-called target solvency margin. This target solvency margin is determined using the following components:

1. Minimum guarantee fund

The minimum guarantee fund represents the lowest permissible threshold for the capital funds required. However, it only serves as a restriction for new and small insurers. In non-life insurance, minimum capital funds range from EUR 0.2 to 1.4 million, depending on the line of business.

2. Solvency margin

The solvency margin sets out the amount of capital funds an insurer must have at its disposal during current operations. The requirement is for a capital base of the same amount as either the premium index or the loss index, whichever is higher.

Premium index:

$0.18 \text{ or } 0.16 \text{ } 15 \text{ *gross premiums *retention rate}$

Loss index:

$0.26 \text{ or } 0.23 \text{ } 16 \text{ *gross claims *retention rate}$

Retention rate:

Net claims/gross claims (but no less than 0.5)

One-third of the solvency margin is defined as the guarantee fund and is the threshold value below which the regulators are authorized.

The law not only sets out the amount of capital funds which the insurer must have (target solvency margin), but the EU directives also prescribe which balance sheet items are acceptable as capital funds. The actual capital funds available are also termed the current solvency margin.

In addition to the solvency regulations, regulations governing how technical reserves are invested are also aimed at guaranteeing an insurer's solvency. The investment guidelines, which apply to technical reserves, are defined in the third generation of EU directives. When investing technical reserves the insurer should take into account security, profitability and liquidity. In addition, the investments should be sufficiently diversified so as to avoid a disproportionately large dependency on a particular investment, asset class or region.

Should the solvency criteria not be fulfilled, the following regulatory steps may be taken:

Current solvency margin < target solvency margin: the company must submit a (comprehensive financial plan) for approval to the supervisory authorities. In exceptional circumstances the authorities can limit or revoke the free disposal of invested assets.

Current solvability < guarantee fund: the company must submit a (short-term financial plan) to the authorities. The authorities can limit or revoke the free disposal of invested assets. The authorities may also limit or revoke the free disposal of invested assets if the conditions relating to the technical reserves are not fulfilled.

The trade-off between security and capital costs

Generally insurers hold substantially more capital than the amount required by regulators. The main advantage of this buffer is that policyholders can feel secure in the knowledge that their claims will be paid and shareholders can be comfortable that the ability of the company to continue making profits is



protected. However, holding capital funds is costly (capital costs). Incurring unnecessary capital costs lowers shareholder investment returns and raises policy holder premium rates. Below we will analyze in more detail this trade-off between security and capital costs.

A number of stakeholders have perhaps diverging interests regarding the equity base required of an insurer. Policyholders benefit from the knowledge that the insurer can meet claims-payin yet policyholders do not want capital requirements to become so burdensome that premium rates become excessive. Regulators, too, aim at protecting the consumer while maintaining the long-run viability of insurance markets. A company's owners, in contrast, are interested in generating a high risk-adjusted return on their investments and so must make a trade-off between protecting the franchise value of their company on the one hand and incurring capital costs on the other. Both staff and management have a vested interest in keeping their company in business and in having leeway for action, while also keeping shareholders happy. Rating agencies, too, are interested in the fulfillment of all obligations, which includes all the claims of investors. Each of these stakeholders has a different view regarding the trade-offs involved in holding capital, and conflicting views about the optimal amount of capital funds can result. From the investors standpoint, the fact that an insurer has capital funds available which it can reinvest in the capital market gives it the traits of an investment fund. The insurer's indirect investment risk in the capital market is leveraged by the underwriting risk. However, an insurance company's investment of capital involves substantial tax disadvantages and agency costs when compared to a direct investment by an investor.

Capital requirements of the rating agencies

The capital requirements imposed by the rating agencies are becoming increasingly important to the success of insurance companies. In a market characterized by growing international competition, a top rating is a must. The capital requirements needed in order to be assigned a top rating are normally higher than those laid down by state regulators.

Rating agencies aim at encouraging security in the fulfillment of payment obligations to policyholders and investors. In addition to solvency, criteria such as liquidity, financial strength and management quality are factored into complex models. Given the different models, it is difficult to find an empirical agreement between the solvency ratio or risk-based-capital ratio and the ratings. An analysis of 878 US companies revealed only a very minor correlation between the risk-based-capital ratio and the ratings assigned by A.M.Best, which are based on publicly accessible information. A model, which included factors such as corporate size and legal form besides the risk-based-capital ratio, can account for only 10% of the variation in the ratings.

Current developments and trends in solvency regulation Changes in the EU

Currently only individual companies are subject to solvency supervision in the EU. This enables insurance groups to use the same capital funds several times at different levels; this is termed double gearing. If a parent company increases the capital funds of a subsidiary, Supervision will remain at the individual company level, but regulators will require intra-group relationships to be monitored as well.

The current solvency margin regulations do not take the risks of long-tail business sufficiently into account, eg in liability insurance. Regulators have therefore proposed introducing a third index based on technical provisions.⁴¹ This so-called provisions index would be used whenever it is higher than the premium or loss index. Such an index, however, would encourage insurers to lower the level of their technical reserves in order to reduce the amount of capital funds they are obliged to hold. Simulations have shown that those companies whose solvency margins turn out to be too low in the three-index system would be deficient under the present system with two indices as well.⁴² Because of these disadvantages, the insurance industry has suggested as an alternative the introduction of higher percentage rates for the calculation of premium and loss indices for long-tail risks. Proposals by the regulators to include investment risk in the calculation of the solvency margin have been put on hold for the time being.



Although it has been frequently criticized, the European Commission has ruled that the maximum adjustment for reinsurance should not be increased from the current level of 50%.

Cash flow models /Dynamic financial analysis

Criticism of the static nature of the current solvency model and its focus on the past as evidenced by its use of annual report data has led to a discussion of future oriented models. The cash flow models that are often used in this context are based on the principle that the economic value of a company is determined by the discounted value of all future cash flows. Cash flows are forecast over a certain planning horizon and the cash values added. The cash flow forecast is heavily dependent on the assumptions made regarding the future development of the business.

Given the interaction of risks on the asset and liability sides, this model is also a regular topic of discussion in the context of asset-liability management. For regulatory purposes the focus is on honoring existing obligations, however. Cash flow models that are drawn up at the request of regulators tend to simulate the liquidation of the insurer (run-off) and not a continuation in the underwriting of new risks, as in the case of asset-liability management.