ICP 12B: A Primer on Non-life Insurance Ratios

Basic-level Module
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A financially sound insurance sector contributes to economic growth and well-being by supporting the management of risk, allocation of resources, and mobilization of long-term savings. The insurance core principles (ICPs), developed by the International Association of Insurance Supervisors (IAIS), are key international standards relevant for sound financial systems.

Effective implementation of the ICPs requires skilled and knowledgeable insurance supervisors. Recognizing this need, the World Bank and the IAIS partnered in 2002 to develop a “core curriculum” for insurance supervisors. The Core Curriculum Project, funded and supported by various sources, accelerates the learning process of both new and experienced supervisors. The ICPs provide the structure for the core curriculum, which consists of a set of modules that summarize the most relevant aspects of each topic, focus on the practical application of supervisory concepts, and cross-reference existing literature.

The core curriculum is designed to help those studying it to:

- Recognize the risks that arise from insurance operations
- Know the techniques and tools used by private and public sector professionals to identify, measure, and manage these risks
- Operate effectively within a supervisory organization
- Understand the ICPs and other IAIS principles, standards, and guidance
- Recommend techniques and tools to help a particular jurisdiction observe the ICPs and other IAIS principles, standards, and guidance
- Identify the constraints and identify and prioritize supervisory techniques and tools to best manage the existing risks in light of these constraints.
Welcome to this module ICP 12: A primer on non life insurance ratios (Module 12B).

This is a basic-level module that forms part of a set of modules for ICP12. This particular module focuses on the financial analysis of non life insurance company financial returns. It does not require specific prior knowledge of this topic however; if you have no prior experience at all then you may wish to review the module on insurance accounting (module ICP 12A) before attempting this module. The module should be useful to either a new insurance supervisor about to undertake the task of reviewing the accounts of a non life insurance company for the first time, or for a more experienced supervisor who has not dealt extensively with the topic — or is simply seeking to refresh and update knowledge.

Start by reviewing the objectives which will give you an idea of what a person will learn as a result of studying the module. Then answer the questions in the Pretest to help gauge prior knowledge of the topic. Then proceed to study the module either on an independent, self-study basis or in the context of a seminar or workshop. The amount of time required to study the module on a self-study basis will vary but it is recommended that it be addressed over a short time, broken into sessions on chapters if desired.

To help you engage and involve yourself in the topic, we have interspersed the module with a number of hands-on activities for you to complete. These are intended to provide a checkpoint from time to time so that you can absorb and understand the material more readily. You are encouraged to complete each of these activities before proceeding with the next section of the module. An answer key in Appendix VIII sets out some of the points that you might consider when responding to the questions in each question set. You will also find question sets dealing with the local situation and related to practices in your jurisdiction. These are intended to help you apply the mate-
rial in this module to your local circumstances. If you are working with others on this module, develop the answers through discussion and cooperative work methods. Since these responses will vary by jurisdiction, the answer key suggests where you might look for the answers.

As a result of studying the material in this module, you will be able to do the following:

1. Given financial reports for comparable periods of non-life insurers operating in the same jurisdiction, construct basic ratios to analyze:
   a. the nature of insurance portfolios
   b. reinsurance
   c. profitability
   d. technical provisions
   e. assets; and
   f. solvency and capital

2. Explain how these ratios are used for financial analysis.
3. Identify trends and propose possible explanations for them.
4. Perform an analysis of the summary financial statements of a non-life insurer based on these relationships.
5. Assess the impact of reinsurance on the results of a non-life insurer during a particular period.
6. On the basis of the assessment, make preliminary proposals for areas where further investigation may be required or where supervisory concerns are raised.
7. Explain how a supervisor can utilize the results of stress testing done by a non-life insurer.
8. Describe some simple stress tests that can be performed by a supervisor, using information from the financial statements of a non-life insurer.
Pretest

Before studying this module on non-life insurance ratios, answer these questions. The questions are designed to help you gauge your existing knowledge of this topic. An answer key is presented in Appendix VIII at the end of the module.

For each of the following questions, circle the responses that is most correct. For each question, only one response is valid being the most correct answer.

1. Which of the following ratios indicate whether (even if only partly) or not a company is profitable:
   a. The “loss ratio” or “claims ratio”
   b. The herfindahl index
   c. The combined ratio
   d. Both (a) and (c)
   e. The cession rates

2. Which of the following are not reasons a company may have a high cession ratio:
   a. fronting
   b. taking reinsurance is a way to access technical expertise from the reinsurer
   c. low capital levels
   d. a high exposure to natural catastrophes in the domestic market
3. In a jurisdiction where there is no solvency margin rule then it would not be possible to calculate:

   a. Alternative claims provisioning estimates
   b. The unexpired risk obligations of the insurer
   c. The solvency coverage ratio
   d. The return on capital / equity ratio

4. Using the 1/8ths method to determine the unexpired premium provision assumes:

   a. Accurate claims files are maintained by the company
   b. All business is written uniformly over the financial year
   c. The unexpired premium is 1/8th of the total premium
   d. Risks are uniform in their incidence throughout the policy year
   e. External auditors check the value of unexpired premium provisions

5. An IBNR item is an accounting element that:

   a. Is never expected to be used except in extreme or catastrophic events
   b. Reflects claims that have occurred before the balance date but the claimant has not advised the company
   c. Reflects recoveries from reinsurers that are estimated but still to be actually paid, being ‘intended but not realized’.

6. When a company is growing market share, this is of interest to the supervisor because:

   a. Capital may be scarce
   b. Supervisory staff can learn how a particularly successful company operates
   c. It is not a concern if the company has taken out additional reinsurance
   d. Growth can mean that the company may need to increase expenses in the future
   e. Underwriting standards may be poor
   f. Both (a) and (e)
   g. All of (a), (c) and (e)
7. **Reinsurance recoverables**
   
a. Are amounts received from reinsurers
b. Include the cost of lunches provided to company executives by reinsurance brokers and reinsurance company management
c. Happen when the credit rating of the reinsurance company is upgraded
d. Include estimates for potential recoveries in the future
e. Provide protection against the risk that a disabled claimant will see their health improve
f. Both (a) and (e)

8. **A stress test is of interest to an insurance supervisor because it indicated:**
   
a. The quality of underwriting of cases where people have high blood pressure
b. The strength of buildings against natural catastrophes
c. The adequacy of available capital
d. Whether a company can continue to pay dividends at the current level
e. Whether a company should alter its investment strategy

9. **Marine insurance provides protection against the following risks:**
   
a. Poor fishing catches
b. Seal level rises from global warming
c. Damage resulting from hitting a pier while trying to dock a vessel
d. Tidal waves
e. Loss of the compass by the ship’s captain
f. Death of a member of the ship’s crew

10. **When a company invests in equities, it:**
    
a. Gains a hedge against inflation when it has longer term liabilities
b. Seeks a higher return
c. Should only do so with limited funds allocated for speculative purposes
d. Should only invest in companies that it knows well such as those that it insures
e. Should consider the liquidity of the shares in the event that it needs to sell them again
f. Only (a), (c) and (e)
g. Only (a), (b) and (e)

11. “Claims run off” is a terms that describes

a. Insurance covering theft
b. The speed of claims settlement
c. Insurance covering hijacking
d. A reducing number of claims due to improved underwriting
e. Claims resulting from flash flooding after heavy rains

12. When an insurance supervisor receives the financial returns from a company, the first priority is to:

a. Check that the auditor has signed them
b. File them carefully
c. Make an extra copy and store it in a safe place in case of fire
d. Order a new filing cabinet
e. Count the number of pages
f. Advise the Minister
g. Make sure that any levy due has been paid
h. Apply for annual leave
i. None of the above

13. Pluvius insurance provides protection against:

a. Influenza in cattle
b. Glass breaking in commercial showrooms
c. The death of key breeding animals
d. Loss of cargo overboard
e. Canceling open air rock concerts if there is a thunderstorm
f. Having to suspend a building development because you find an archeological site when excavating the foundations
g. None of the above
ICP 12B:
A Primer on Non-life Insurance Ratios

Basic-level Module

A. Introduction

The purpose of this note is to set out some ratios that can be used to analyze the financial information of non-life insurance companies. It is intended that this note will act as a useful summary for insurance supervisors who are relatively new to the subject.

Ratios of this type may serve four particular purposes for the insurance supervisor:

- As part of the analysis of financial returns within the supervisory process: Supervisors receive financial information from insurance companies on a periodic basis. The first step required of the supervisor when this information is received is to review and analyze it. Examination of past performance, along with other information, can help to form a view as to the expected future prospects and risks that may be of concern to the supervisor. From this analysis, issues and questions can arise that can be identified, escalated through the supervisory process within the supervisor’s office, and considered for further investigation and action by the senior officers in the supervisory authority.

- As an ‘early warning system’: In many jurisdictions, the trends and levels of ratios are used as an ‘early warning system’. As such, when a ratio or a series of ratios moves in an adverse direction or crosses some determined threshold then escalation of concern follows. In many cases, each of the ratios are examined separately and then a qualitative judgment is made about the conclusions that

1. ‘Financial information’ in this document is taken to mean the information provided to the supervisor through the financial and statistical returns.
2. The Insurance Core Principles address the wider issue of the supervisory process in ICP 4. This paper, therefore, can be considered to be just one part of the overall supervisory process.
should be drawn from the results. In some cases, a more quantitative decision rule is applied. An even more advanced approach has been to take a set of ratios and, using statistical analysis, determine a formula for the combination of ratios into a single index—however the results of these approaches have generally not been sufficiently satisfactory to adopt it to the exclusion of examination of individual ratios and the amount of work required to develop such a system is substantial.

- **As part of “risk based supervision”:** Some supervisors adopt an approach to supervision that is “risk based”. This approach is not subject to elaboration in this paper but it is noted that ratio analysis can form an important element of such an approach, including to assist supervisors in making a specific allocation of regulatory efforts toward companies that they perceive as needing a greater or lesser effort as a consequence of the risk that they identify.

- **To enable the compliance with requirements of the laws and regulations to be assessed:** In any event, the objective of analysis of an insurer’s returns goes beyond verifying that the company is complying with the law and other regulatory requirements. Ratio analysis informs the overall assessment of the company by the supervisor. The supervisor is interested in understanding, as much as is possible and practical, the financial condition of the company, its performance, its expected future performance, and the possible risks that may lead to adversity in the company’s financial condition in the future. Ratios inform this analysis and, along with other information, are a critical element to the making of this supervisory judgment.

### Relevance to the IAIS core principles

IAIS Insurance Core Principle 12 is the main aspect where the content of this paper is focused. ICP12 covers both the financial reporting required of companies and also the analysis of these returns done within the supervisory authority. The analysis is referred to in the final bullet point of Essential Criteria c’ that says:

“The supervisory authority … based on this [financial report] information, maintains a framework for on-going monitoring of the financial condition and performance of the insurers.”

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3. For example, in the Insurance Regulatory Information System (IRIS) in the USA, when first introduced, 11 ratios were calculated for non life insurers and escalation was triggered if four of the 11 ratios were of concern. The 2002 version of IRIS has evolved to 12 ratios for non life insurers. For more information on IRIS for non life insurers, see NAIC 2002. Other supervisors may have a similar system of ratios however, unfortunately, the tendency is not to make them public as references.

4. Other information that would normally be used as part of the supervisory assessment would include both quantitative and qualitative market information, press reports, company announcements, discussions with company executives, ratings agency reports and stock market information. The study of this information is not part of the scope of this note. System of ratios however, unfortunately, the tendency is not to make them public as references.
Not all the ratios set out in this paper are required to be assessed to observe the principle. Rather, a range of possible ratios is included in the paper and some may be more relevant than others in the particular jurisdiction.

The ability to carry out an analysis using the ratios set out in this paper will depend on whether or not the data is made available to the supervisor. Not all of the data set out as being useful in this paper may be received by the supervisor. In such cases, there may be a need to consider whether the forms submitted need to be revised to collect additional data or whether the focus of the analysis can be adequately addressed with the analysis of some, rather than all, of these ratios.

Alternatively, the supervisor may receive other information that is useful but is not referenced in this paper. In such cases, it is recommended that the analysis of the company should consider all the information provided—the absence of reference in this paper should not be taken as meaning the information can be safely ignored.

**Market analysis**

In this paper, we have referred to the usefulness of wider market analysis to inform the interpretation of the ratios calculated for an individual company. Market analysis is covered in ICP11 and not detailed in this paper. It is, however, an important input into the processes of off site monitoring and assessment. For example, in one case it may be that the general economy may have seen a fall in interest rates or equity values. It will be possible to identify that an insurer has seen the impact of such a change in conditions on its financial condition and this may give rise to a concern.

However, it will be of greater interest to also determine whether the effect on the company was greater or less than that for the wider industry, as this may help to interpret the level of concern arising. Other examples of such wider events could include the
effect of changes in legal interpretations on policy claims levels, changes in the general
level of crime, or the occurrence of natural catastrophes.

This type of analysis requires, of course, that the calculation of ratios is done on
a consistent basis for all companies in the jurisdiction and over time so that they are
comparable.

A health warning

Ratios are an average result of a series of underlying individual policy performances
and risk outcomes. It is well known to insurance specialists that averages can hide many
evils for the unsuspecting. Insurance is, by its very nature, about the extremes more
than it is about the averages.

In many cases, ratios also rely on the accuracy of accounting or other reported fi-
nancial information and, in particular, on the validity of estimates made for such values
as provisions. If there is a general doubt about the veracity of the accounting figures
then this needs attention before further analysis is done on what would be a question-
able basis. However, even where accounting practices are reasonable and perhaps more
so than in other areas of the financial sector, insurance ratios must be taken as indicative
rather than conclusive as they are often still based on figures that are subject to le-
gitimate scope for ‘judgment’ or differing legitimate points of view. Ratios can provide
an indication of areas for closer examination but do not, of themselves, provide as full
and definite statement of the situation that they may, to the less experienced, purport
to show.

Similarly, special care will be required in interpreting values that have been calcu-
lated where an insurer has undergone some restructuring of the business during the
period. This will be the case especially if there has been a transfer of business portfolios
into or out of the company in the period.

It is useful to be able to record and examine trends in ratios over time, and for ef-
fective early warning, ratios over time may be calculated quarterly in many cases. Inter-
pretation of trends in quarterly data can, however, be influenced by seasonal factors.

In summary, it is important to interpret ratios with an inquiring and cautious mind
and, in most instances, the relevant response to issues raised by the analysis will be
further and more detailed investigation and inquiry rather than simply considering a
confirmed conclusion to have been reached.

Definitions

A short glossary has been provided in appendix I and terms used are also consistent
with the IAIS Insurance Glossary (see IAIS 2005).
The term ‘claims’ has been used in this paper where some jurisdictions may refer to ‘losses’. Hence, some readers may be more familiar with the term ‘loss ratio’ than ‘claims ratio’. In this paper, ‘losses’ are used for accounting losses.

The term ‘capital’ has generally been used to refer to the overall capital resources of the company, however defined in the jurisdiction’s accounting rules and insurance regulations, and the term ‘equity’ when it specifically is limited to that capital provided by voting shareholders. In many jurisdictions this will be the same thing.

The word ‘provisions’ or words ‘technical provisions’ have been used instead of what some jurisdictions would define as ‘reserves’ to distinguish between those relating to the insurance policies and other more general ‘reserves’.

On several occasions in the paper it is suggested that ratios can be determined on the basis of the whole of the portfolio or for particular ‘classes of business’. Such classes of business may be defined in the reporting forms or the legislation in the jurisdiction. Wherever it occurs, it may also be interesting to analyze groups of classes such as all long tail or short tail business or of those classes that represent a market segment such as those that are generally commercial business as compared to those classes that are more generally domestic or retail in nature. (refer also to Examples of defined classes of business at in appendix III).

B. Business Volumes and Trends

This section examines ratios that seek an understanding of the nature of and trends in the business that the insurer is writing, including its sources and prices. To this end, the focus of the ratio is on premium.\(^5\)

To interpret these premium based ratios, it is also useful to study industry wide levels for the equivalent ratios. More general factors such as the performance of the economy, levels of inflation, unemployment, growth rates and the level of growth relative to the general growth in the economy (usually the level of written premium relative to GDP\(^6\) can be considered) will be reflected in insurance markets. It is also necessary to be aware of wider developments such as the privatization of a class of business, changes in the taxation basis that may make a class of business more or less attractive, changes in the regulatory environment that may lead to volume changes etc. Price levels can also be subject to cycles that will flow through to periods where there is upward or downward pressure on premium volumes. Costs of insurance can also change with changes in such widely varying factors as weather conditions, crime rates, the nature of safety or security equipment in general use, or the extent that laws are subject to policing. The results of market analysis should provide this input.

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5. Premium can be defined in a number of ways. Depending on the accounting regime in the jurisdiction, premium written may be different from premium income but this should not prevent the ratio being investigated as it will still be relevant.

6. The ratio of premium to GDP for the whole sector is termed “Insurance Penetration” and is used as an indicator of role of the insurance sector in the economy as a whole. Rates of insurance penetration are regularly published and usually on the basis of gross written premium to GDP. In the event that the economy grows more generally, measured by GDP, it can be expected that the need for and use of insurance would grow at a similar rate, all other things being equal.
The starting point is to summarize the business mix in terms of the proportion of premium for the company which comes from each class of business and to reflect on how this compares with previous years. Changes in business mix can reflect positive management action. Alternatively, they can reflect ‘accidental’ increase in exposure to less profitable segments through inadequate pricing. The business mix and the trends in the mix will inform the analysis suggested later in this paper.

An analysis of trends and growth rates in premiums can raise a number of questions that may need further investigation to answer. For example,

- In the event that an insurer is growing its written premium quickly, this may indicate that the insurer is under-pricing its products or that underwriting standards are being relaxed. Alternatively, it may indicate that the insurer has simply increased its effectiveness in the market or that it is successfully increasing premium rates.
- In the event that written premium is growing quickly, there is a risk that the insurer’s infrastructure may not be adequate to properly manage the increased volumes of business.
- In the event that net premiums are growing quickly, the question arises as to whether the insurer has the financial resources to retain the level of risk that it is carrying and, if such growth were to continue, whether the insurer will need to raise capital in the future (see also Premiums and capital in section G).
- If growth rates show a marked decline, the reason for the reduction needs to be identified. It may be a concern that an insurer has lost its ability to be competitive in the marketplace. A smaller business portfolio will impact profitability to the extent that the insurer is not able to reduce costs, particularly through the effect of fixed costs. An insurer may have simply found that it has had to reduce prices to remain competitive—giving rise to the suggestion that profitability will be adversely impacted. At the same time, the insurer may be reducing its prices whilst achieving a greater reduction in the risk that it holds by increasing the excess / deductibles on claims that it incorporates in its policies.
- With respect to a particular product line, a large increase in volume may signal a sudden change whereby the insurer has entered a new product area, distribution niche, or sales territory. It would be a concern if an insurer did so without recognizing that it will have limited experience in the nature of the risk in this new area. There have been cases where companies have viewed such growth positively up until they start to see the claims emerge to such an extent that they realize that they were, in fact, writing a disproportionate proportion of the poorer quality risks.
- In the extreme, a company may attempt to write more business so as to increase cash flow in order to meet current claim payments. This is a particularly concerning situation.
The ratio for premium growth based on Net Written Premium has been identified in the IRIS system as ratio number 3. In that case, the NAIC warn that where the premium either increases or decreases by more than 33% it is a trigger point for closer review. As noted above, the level that is relevant for a particular jurisdiction will depend on the market conditions.

With respect to renewal rates, in usual circumstances, an insurer will benefit from a high rate of renewals, as this is a far less expensive way to generate premium income than by finding new customers and new business. At the same time, it is reasonable to expect that a number of customers will choose not to renew with the insurer for quite straightforward reasons, for example, in the case that they no longer own the property that was insured.

In some cases, also, the insurer may determine that it is no longer prepared to offer renewal to some customers, as it considers that their risk profile is higher than it would like. In fact, it is both best practice and important from a risk management perspective, that an insurer does not simply offer renewal to all customers without taking the opportunity to consider whether or not it is prepared to do so. Whilst this consideration is likely to be largely computerized for smaller policies, a proper underwriting function will include such a mechanism in one form or another. Over time, the company attitude may change with respect to this issue. For example, in a hardening market when insurance capacity is more difficult to find, customers may see companies take a harder line on offering renewals, either completely or on equivalent terms with comparable levels of cover. Whilst the analysis of ratios will not elaborate such a change, it may identify the need to find out directly from the company about this issue. That said, where an insurer has a high renewal rate, it may indicate that it is not properly considering whether or not to offer renewal to policies in the light of the risk.

Where an insurer has a low renewal rate, then this may reflect poor customer service, products that are not competitive, or the effects of particularly fierce competition.

As a result, renewal rates provide an indication of the company’s competitive position, the security of the value of its business franchise, and the efficiency of its operations.

**Premium growth rates**

These ratios can be calculated on the basis of written premium or earned premium or both, gross and net of reinsurance, and by class of business, business segments (for example, retail compared to commercial business lines) or for the total portfolio. If information is available, premium growth rates can also be calculated in terms of new business only.

\[
\left( \frac{P_t}{P_0} - 1 \right) \times 100\% ,
\]

(1)
where $P_1$ is the premium in the current accounting period; and $P_0$ is the corresponding premium in the previous accounting record.

### Renewal rates

These ratios are more usually calculated on the basis of gross written premiums, and by class of business, business segments or for the total portfolio.

As renewal rates reflect the relationship between the company and its customers, it is not usual to examine renewal rates using premium information net of reinsurance.

This ratio is of less relevance for reinsurance business as this business involves a smaller number of large contracts so it can be expected that the ratio will be volatile in normal circumstances.

\[
\left(2\right) \frac{GRP_1}{GWP_0} \times 100\%
\]

where $GRP_1$ is the gross written premium from renewals in the current accounting period; and $GWP_0$ is the total gross written premium for the same class of insurance in the previous corresponding accounting period.

In interpreting this ratio comparing across companies, the administrative practices of a particular company may reflect the rates that are calculated. If an insurer is asked to alter a policy on renewal, some administrative systems will enable this to be done as an alteration without discontinuing the existing policy record whereas others may involve the cancellation of the existing policy and the establishment of a new policy with the altered details. The former approach gives a better estimate of the renewal rates as the latter approach will increase the reported new business when this is not, in fact, the actual situation.

### Changes in ‘per risk’ premiums

In some cases, it may be desirable to investigate the premium changes further by considering the trends in the premium against a measure of risk. The ability to do this analysis will depend on the information available.

The two main possibilities are to also collect information on policy numbers or on sums insured. The average premium per policy may then give an indication of the average policy charge and, all other things being equal, will rise as prices increase. The premium as a proportion of total sums insured may also provide such an indication.

Neither ratio is perfect as they make assumptions that are likely to be less reliable for small portfolios or more customized business lines such as commercial business or reinsurance. But they can be of some indicative value in cases where additional investigation is required to fully prepare for inquiries with the company, so that the supervisor is better equipped to interpret the response of the company to these inquiries. One
example where this may be of use, to a greater extent, is where the policy terms and conditions and coverage are largely defined and uniform. Such a situation may exist with respect to compulsory third party liability insurance for motor accidents where the policy benefits may be set out in the law. As such, each policy provides identical cover so the basic cost is somewhat generic. Such a generic underpin to the product can illuminate further analysis and make it of greater relevance. (refer to Short case study of compulsory third party motor insurance premium rates in New South Wales, Australia in appendix IV).

**Exercises**

1. **Identify the classes of business that are used for reporting in your jurisdiction. For each class, prepare a short paragraph description of the nature of the insurance risk included in that class of business describing**
   
   a. the types of events normally covered by the this class of insurance;
   
   b. whether it is long tail or short tail in nature
   
   c. of all those that are used for reporting purposes, identify the three most significant classes of business

2. **Using the model accounts provided in appendix VII,**
   
   a. calculate as many of the ratios discussed in this section as you can.
   
   b. list the ratios that are discussed in this section that you are not able to calculate because of missing data items, identifying those missing items.

3. **Discuss your views on the results of the calculations from exercise 2, noting your conclusions in the following areas:**
   
   a. What possible concerns or conclusions are suggested by these calculations?
   
   b. To the extent that these conclusions may be tentative, what further inquiries or investigations might you consider recommending so as to reach a firmer conclusion?

4. **Compare the returns provided to your supervisory authority and identify those ratios identified in this chapter that you could calculate using the information provided, and those ratios that you could not calculate as the information is not provided. Does this answer vary between returns that are provided annually and those returns that are provided more frequently?**
C. Reinsurance

This section examines ratios that seek an understanding of the nature of and trends in the transition between the business that an insurer accepts from its customers and the business that it actually retains on its books as exposure. Reinsurance use by direct companies is influenced largely by their desire to protect their capital from extreme events and also, most often, to ensure that reported profits are not unduly volatile. Companies can choose, in theory, between retaining risk and allocating capital to cover that risk, or transferring the risk to a reinsurance company.

In some cases, reinsurance will also be the means that companies can provide cover to customers that would otherwise not be possible. For example, where a large industrial plant in a small jurisdiction is to be insured then no company may have the capacity to hold this cover on their own account. As such, reinsurance cession is a means to providing this cover and meeting the needs of the customer. Consequently, cession rates will not be the same in all countries but will vary based on market circumstances in each jurisdiction.

However, where cession rates are high relative to the industry then this may suggest that the company is either purchasing far more reinsurance than its peers or that it is paying more than would be expected for a similar amount of cover. If the company purchases more than the usual level of reinsurance then the suggestion is that it may feel, implicitly or explicitly, that it does not have the capital available to allocate to the risk as much as other companies. This would be of interest to the supervisor. Where it is paying more for the similar level of reinsurance protection, then this would indicate that the reinsurance companies feel that the portfolio of the insurer is poor, and given that the cession rates are relative to the premiums charged, that it may be under-priced by the ceding company. This should also concern the supervisor.

In some circumstances, the pricing cycle in the reinsurance market will play into an insurer’s attitude toward ceding risk. If reinsurance is relatively cheap then the cost benefit analysis will make reinsurance relatively more attractive and it may make sense for an insurer to increase the amount of risk that it cedes to reinsurance companies, taking advantage of the lower costs. As a result, changes in reinsurance cession rates need to be interpreted in the context of costs and prices in the reinsurance markets more generally, and understanding the company ratios will be informed by an understanding of the behavior of the market as a whole and the reaction of other companies to the same changes to pricing of reinsurance.

Where the use of reinsurance shows a change over time, either decreasing or increasing, it suggests that the company is changing its reinsurance policy and practice. A supervisor should be interested in knowing the reasons for change with some certainty. Is the company feeling that the exposure to risk has increased? Are they of the view that their capital situation should be less exposed? Are they concerned that their capital position is, in some way, less secure?
The special issue of “fronting”

If the use of reinsurance is particularly high then an insurer may consider itself to be largely immune to the underlying risk. In some cases, for example, an insurer may be presented with a risk that it would not normally accept but it is also presented with a corresponding reinsurance contract that means that the company would appear to bear little of the insurance risk. In such cases, the company may decide to write the policy and take out the reinsurance contract and simply to make a profit from the reinsurance commissions it will receive.

In fact, fronting has its dangers to the company and does not represent best practice. First, an insurer should remember that the reinsurance company may fail to deliver on the reinsurance contract resulting in the company actually being on risk in full. By way of example, refer to Table 1 that has some industry wide retention rates for a particular jurisdiction.

In this case, a high retained risk focuses on the Motor Class whereas the other classes retain much lower levels. The figure for property business is further distorted in the year 20n3 by the effect of commission rebates. This is highlighted by the result that commission rebates actually exceed retained premiums. This strongly suggests an abnormal reinsurance level and an absence of risk retention quite apart from the other cession rates shown in the table. In other words, the financial effect of the business in this jurisdiction was driven by commission rates rather than the performance of the underlying risk.

Second, from a public policy perspective, fronting is a means of getting around requirements to be licensed in the domicile. It is a practice that, in effect, amounts to the company renting its license to conduct insurance business to others.

Cession rates

Cession rates focus on the proportion of the premium that the company takes in through it’s relationship with its customers that is ‘ceded’ through its reinsurance arrangements.

<table>
<thead>
<tr>
<th>Year</th>
<th>20n0</th>
<th>20n1</th>
<th>20n2</th>
<th>20n3</th>
<th>20n4</th>
<th>20n5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor</td>
<td>95</td>
<td>93</td>
<td>95</td>
<td>76</td>
<td>74</td>
<td>80</td>
</tr>
<tr>
<td>Property</td>
<td>13</td>
<td>15</td>
<td>26</td>
<td>–9</td>
<td>25</td>
<td>16</td>
</tr>
<tr>
<td>Marine</td>
<td>25</td>
<td>25</td>
<td>19</td>
<td>12</td>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>Others</td>
<td>28</td>
<td>41</td>
<td>36</td>
<td>31</td>
<td>28</td>
<td>34</td>
</tr>
<tr>
<td>Total non-life sector</td>
<td>58</td>
<td>61</td>
<td>60</td>
<td>48</td>
<td>53</td>
<td>55</td>
</tr>
</tbody>
</table>

Source: National government figures and staff analysis
where $R$ is the reinsurance expense\(^7\) for the particular class of insurance and accounting period; and $GWP$ is the gross written premium for the same class of insurance and accounting period.

**Net retention rates**

As an alternative to cession rates, the net retention rate may be calculated. This is equivalent as the gross premium less the reinsurance expense is equal to the net premium.

\[
\left( \frac{NWP}{GWP} \right) \times 100\%
\]

where $NWP$ is the net written premium for the particular class of insurance and accounting period; and $GWP$ is the gross written premium for the same class of insurance and accounting period.

Cession rates or net retention rates can be calculated by class of business or for the total portfolio of the company. It is also possible to calculate the rates on the basis of earned premiums instead of written premiums, comparing the gross earned premium with the net earned premiums, however, care is required in the interpretation of such results as they will be influenced by provisioning elements.

**Maximum event retentions**

Increasingly, with the use of more complex risk management and measurement techniques, companies have sought to determine a maximum that they will have to pay out in the case of a single catastrophic event (the Maximum Event Retention or ‘MER’), or the maximum total claims that they may have to pay in the event of a probable but very unlikely event (sometimes referred to as the Probable Maximum Loss / Claim or ‘PML’). These events can be described in terms of their low probability, or ‘return period’ where an event with a probability of 0.5% in a year would have a ‘return period’ of 200 years or be described as a ‘one-in-200 year’ PML event.

The supervisor will be unlikely to receive sufficient information to calculate the MER or PML themselves as part of the financial returns, but the company can report the figure that they have determined to the supervisor. It can also be interesting to know the event that would lead to the MER or PML.

---

\(^7\) For a definition of reinsurance expense see the glossary in appendix I.
The MER can then be compared with the capital available. This can indicate whether the company would still be commercially solvent if the event occurred, or how many such events the company could withstand before it would have an asset deficiency.

\[
\left(\frac{\text{Capital}}{\text{MER}}\right) \times 100\%
\]

where MER is the maximum event retention; and Capital is the balance sheet capital held by the company at the end of the accounting period.

**Reinsurance recoveries**

Reinsurance recoveries (amounts owing from reinsurers or amounts that are expected to be claimed — the difference between gross and net (of reinsurance) technical provisions) can represent a large part of the insurance company balance sheet. Determining the extent of this exposure is important as it may be necessary, if the ratio is at a level that is of concern, to gain some assurance as to the underlying credit risk represented. This is usually done by comparing the recoveries to the total assets, or to the capital resources of the company.

In the event that an insurer has a large exposure to a poorer quality reinsurance company then this would represent a supervisory concern. Similarly, as the quality of counter parties can change, it is prudent to have a diversified rather than a concentrated set of reinsurance counter parties in any event.

It is an open question as to how credit risk should be assessed. Some have argued that it is better to be exposed to a single reinsurer rated AAA than to three insurers rated at a lower level—‘A’ for example. Whilst the credit rating overall may be better, there is a question of concentration risk. Usually, it is important when there is a question to make a judgment about the individual exposures and to, at least, monitor them closely.
D. Profitability—Level, Quality and Source

This section examines ratios that seek an understanding of the profitability of the business. Profit (or loss) can arise from three main sources.

The first influence on profit performance is the underlying claims that arise from the business that the company has written. Claims costs are influenced by both the number and the size of claims and the extent that they are less (or more) than was anticipated in the premiums charged. Here the Claims ratio is the conventional long standing indicator of profitability and underwriting quality. Where the ratio is high, this indicates that premium rates are too low for the level of risk or that the claims experience has deteriorated. Either way, company profitability will be endangered.

Even where the ratio is low, this may be of some supervisory interest. Where an insurer writes particularly profitable business then there may ultimately be a question as to whether or not it can do so indefinitely. In some cases it is reasonable to expect that it will, due to a particular specialization in the way that the company markets or manages the product, whilst in other situations prudent management would consider the

Exercises

5. Using the model accounts provided in appendix VII,

a. calculate as many of the ratios discussed in this section as you can.

b. list the ratios that are discussed in this section that you are not able to calculate because of missing data items, identifying those missing items.

6. Discuss your views on the results of the calculations from exercise 5, noting your conclusions in the following areas:

a. What possible concerns or conclusions are suggested by these calculations?

b. To the extent that these conclusions may be tentative, what further inquiries or investigations might you consider recommending so as to reach a firmer conclusion?

7. Compare the returns provided to your supervisory authority and identify those ratios identified in this chapter that you could calculate using the information provided, and those ratios that you could not calculate as the information is not provided. Does this answer vary between returns that are provided annually and those returns that are provided more frequently?
alternatives and seek strategies to respond to increased competition or guard against loss of advantage in the future. It is reasonable to ask what strategies the company may have to maintain this particularly favorable situation into the future and what actions it will consider, by way of having contingency plans in place, should the profitability of this business line come under market pressure.

The second source of profit performance is the expenses associated with the administration of the business. The conventional approach to this measure has been the Expense ratio. Higher ratios indicate that the business is cost-intensive or that the company is less efficient. Larger companies and smaller companies can be expected to show different ratios due to economies of scale and the influence of fixed costs — however this is not always the case and would also reflect management capacity to manage costs effectively. Similarly, where an insurer is growing, it should have a progressively declining expense ratio. This will not always be observed and an indication of poor expense management ultimately raises concerns.

Within the same company, it may be that the expense ratios are different between classes of business. There may be a valid reason for this but it is reasonable to check the allocation of expenses by examining the more detailed breakdown of expenses that may be provided in the supporting accounts.

Some companies will have a greater or lesser proportion of their own administrative costs associated with the payment of claims. For example, an insurer that wrote long-tail business in the past then changed the business mix to short-tail business will still, probably, be paying long-tail claims as they emerge over time. These expenses will be reflected in the accounts, but the income to pay for them should come from the release of the claims provisions (that should include allowance for these costs) rather than from the current premiums — something that the Expense ratio does not reflect. As a result, interpretation of the ratio may require additional examination in such special cases. The extent that the company uses its own staff or external claims assessors will also lead to differences and, where an insurer has an atypical approach to this then it may influence the interpretation of the results of the calculation.

The third element will be the return that the company is able to extract from the investment of funds. It can be important to investigate both the actual result from the investments as well as the components of this result (refer to Quality of the investment result below).

Traditionally, non-life insurance operations have been considered as companies that take on risk through the writing of policies, lay off some of this risk through reinsurance, and then try to ensure that the remaining retained premium is sufficient to cover claims, expenses, and make a profit. With such a philosophy, investment returns were treated as somewhat fortuitous rather than a part of the core operation. It is still most likely that the largest source of risk, and hence the focus of management attention, will be on the underwriting ‘side’ of the business. This approach gave rise to the Combined ratio and a rule of thumb that an insurer will be making underwriting losses where the combined ratio is in excess of 100%. It should, however, not be making losses
overall at this level due to the investment result. Consequently, in a competitive market, it is not unusual for the combined ratios to be slightly above 100%. There will, however, be a clear concern where combined ratios exceed 100% by a substantial margin. To reflect this element, the Operating ratio is sometimes used. More generally, various Profit ratios are directed at the same overall assessment of profitability. The Profit ratios reflect a measure of ‘reward’ relative to the size of the business in general terms. Compared to ratio analysis for other financial enterprises, the profit ratio can be interpreted as a profit margin, so the ratio of profit to gross written premium is a form of margin on sales ratio.

The ratios will, in fact, be a mixture of the performance of the business written on gross terms and the margin given away or earned through the terms of any reinsurance. In the most complex analysis, it may be useful to separate these influences so as to determine the extent that the company earns margins from the business it writes separately from the effect of its reinsurance program on these margins.

An example of this is included as “Sample separation of underwriting account elements” in appendix V.

The various ratios in this section are sometimes calculated on the basis of more than one accounting period.⁸

**Claims ratio**

\[
\left( \frac{IC}{EP} \right) \times 100\%
\]

where \( IC \) is the incurred claims in the current accounting period; and \( EP \) is the earned premium for the same class of insurance in the corresponding accounting period.

(See Definitions in appendix I for the explanation of ‘incurred’ claims and ‘earned’ premiums).

As both the incurred claims and the earned premium values are functions of provisions (for claims and unearned premiums respectively), then any change in the manner that provisioning is determined will also influence the ratio (see E. Technical Provisions below).

The ratio can be calculated on the basis of both net and gross (of reinsurance) values and for classes of business. For classes where the amount of business is small, however, it is reasonable to expect that the result will be more volatile or extreme.

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⁸ For example, the IRIS ratio number 5 uses a two year period for the operating ratio. In the US context, a ratio over the two year period in excess of 100 is considered to be unsatisfactory.
**Expense ratio**

\[ \left( \frac{E}{WP} \right) \times 100\% \]  

where \( E \) is the expenses in the current accounting period; and \( WP \) is the written premium for the same class of insurance in the corresponding accounting period.

The expense ratio can be calculated on the basis of both net and gross (of reinsurance) values for written premium. Where net written premium is used then expenses would be reduced by reinsurance commissions received.

Written premium is used as it is the general expectation that a large component of the expenses will be related to the initiation of the policy (commissions, underwriting costs, etc.) making earned premium a less useful measure. Unless growth rates are rapidly increasing or decreasing then the use of written or earned premium will not make a considerable qualitative difference to the conclusions from examining the trends in this measure.

**Combined ratio**

\[ CR + ER \]

where \( CR \) is the claim ratio; and \( ER \) is the corresponding expense ratio.

As the claim ratio and the expense ratio can be calculated on a basis that is either net or gross of the reinsurance accounts, then the combined ratio can also be calculated on a net and gross basis.

**Investment income ratio**

In an effort to recognize the role of Investment Income as a contribution to the overall result, the Investment Income Ratio may be calculated.

\[ \left( \frac{EI}{Premium} \right) \times 100\% \]

where \( E \) is the earned investment income in the accounting period; and \( Premium \) is the premium (for the same class of insurance) in the corresponding accounting period.

It would be normal to calculate this ratio with respect to net earned premium rather than gross earned premium as the investment income itself can be expected to be based on the assets that support the net provisions and the investment of the net premiums. In unusual cases, the assets relating to some or all of the reinsurance may be invested by
the ceding company, and the treatment of the investment income, and for that matter the assets, in these situations should be understood.

**Operating ratio**

As the Combined Ratio does not include a reflection of the investment income then the Operating Ratio has been developed.

\[
CR + ER - IR
\]

where \( CR \) is the claim ratio; \( ER \) is the corresponding expense ratio; and \( IR \) is the investment income ratio.

The inclusion of the Investment Income Ratio, normally calculated on a net earned premium basis, means that it is usual to calculate the operating ratio on the basis of net earned premiums for the claim ratio as well and net written premiums for the expense ratio.

**Profit ratios**

\[
\left\{ \frac{Profit}{Premium} \right\} \times 100\%
\]

where \( Profit \) is the profit in the accounting period; and \( Premium \) is the premium for the same class of insurance in the corresponding accounting period.

Profit can be considered in a number of ways for this ratio. For an individual class of business it would normally be taken to reflect the net earned premiums plus other income with respect to that class of business less net incurred claims and expenses attributable to the class of business (i.e., the underwriting result). Additionally, it could add the investment income (to get to the profit before tax) although it is not so common to expect that investment income would be allocated to classes of business within an insurer’s portfolio, so the inclusion of investment income is more common for analysis at the total company level. For more globally calculated ratios, the addition of allowances for tax and other items as well as expenses and other income that are not attributable to a particular class of business is also more relevant.

The ratio can be determined using net or gross premium in the denominator.

When the underwriting result is used along with the net earned premium then it is sometimes called the underwriting ratio.

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9. In this paper, the underwriting result is defined as the profit or loss arising from the insurance operation but not allowing for investment operations. For an example of the calculation of the underwriting result see the attachment “Sample separation of underwriting account elements” in appendix V.
where \( U \) is the underwriting result in the accounting period; and \( NEP \) is the net earned premium for the same class of insurance in the corresponding accounting period.

The underwriting ratio will be different to combined ratio as the combined ratio uses written premium for the expense elements of the ratio. Overall, also, the profit ratio may be different from the operating ratio depending on additional elements that the definition of profit takes into account such as realized and, perhaps, unrealized gains and losses on investments, taxes and any abnormal items. This highlights the relevance of an investigation that looks at several profit definitions and not simply the 'bottom line'.

**Quality of the investment result**

As indicated above, the investment result will have a number of components. These will be the investment income itself, and then the contribution from realized gains or losses and (in the case of assets marked to market) from unrealized gains or losses.

In a book value accounting environment, the realization of investment gains adds to profit in the accounting period that the assets are sold. In reality, however, the gains have been made over the lifetime of holding the particular assets. If an insurer has increased the profit reported in a recent accounting period through an abnormal realization of gains that it previously had in the ‘hidden reserves’ represented by the gap between market and book values of assets then the question arises as to whether or not this is likely to be continued in the future with further gains or whether this was a one off event that cannot be counted on as being repeated.

In a market value environment, both realized and unrealized gains come into the profit result. Consequently, in accounting periods of abnormal asset appreciation in the investment markets then the company will show an improvement in profitability that can almost be considered to be something fortuitous although they may be tempered by consideration of equally abnormal losses in prior periods.

The objective is to determine how much of the profit contribution has come from each source so that we can examine the trends and likely future prospects for the contribution of investment returns to the company—usually important in maintaining the company profitability.

Several ratios could be used for this purpose. First, if we look at the issue from the basis of a premium type ratio then the conceptual approach is to seek to split up the investment related parts of the Profit ratios into component parts.

In a book value environment this would mean separating the investment income from the realized gains and losses and looking at the trends in the two separate elements
over time. The Investment income ratio gives us trends in the income as a percentage of earned premiums, so the natural ratio to consider would be

\[
\left\{ \frac{RGL}{Premium} \right\} \times 100\%
\]  

(13)

where \(RGL\) is the realized gains and losses reported in the accounting period; and \(Premium\) is the premium (for the same class of insurance) in the corresponding accounting period.

Usually, this ratio would only be available for overall results as realized gains and losses would not normally be available by class of business. It may also be useful to consider ratios that examine realized or unrealized gains separately from losses as the combining of these two may mask some information that could be useful. For example, the realized or unrealized gains may be persistently coming from one asset class and the realized or unrealized losses from another class.

Where an insurer wishes to improve an otherwise poor result then it may realize some assets close to the end of the reporting period to restore profitability to the desired level. If this is indicated, then it may be useful to identify the level of unrealized gains that the company continues to have available in the future to continue with such a strategy. Even where the company has not sought to improve the profit result in this way, an examination of the following ratio will inform the extent that assets are being actively traded or are being held in a more passive investment style.

This could be measured by calculating the ratio of realized gains and losses to the amount of unrealized gains and losses available,

\[
\left\{ \frac{RGL}{MVA - BVA} \right\} \times 100\%
\]  

(14)

where \(MVA\) is the market value of the assets; and \(BVA\) is the book value of the assets. (Note that it is open to use the MVA and BVA values at the start or end of the accounting period or even as an average of the two, but comparisons need to be on a consistent basis).

Or, alternatively, to look at the level of unrealized gains as a hidden margin, along the lines of…

\[
\left\{ \frac{MVA - BVA}{BVA} \right\} \times 100\%
\]  

(15)

All of these ratios are open to potential uncertainty due to the fact that net results may be used. That is, large gains and losses may offset each other in the accounts. As a result, the absence of a concern arising from these ratios does not necessarily mean that such a concern can be discounted.

Asset based ratios are also helpful in terms of examining the levels of returns. The traditional formula (Equation 16) reflects an assumption that investment income is
earned over the course of the accounting period so would be measured against the average assets invested in the period.

\[
\left\{ \frac{2 \cdot I}{A_0 + A_1 - I} \right\} \times 100\%
\]

where \( I \) is the investment income in the current accounting period; \( A_0 \) is the invested assets at the beginning of the corresponding accounting period; and \( A_1 \) is the invested assets at the end of the corresponding accounting period.

Such rates could be calculated on a net or gross (of tax basis) and could be examined. Book values and market value calculations are possible and the investment return element (I) can be defined to include or separate investment income, realized and unrealized gains, as is relevant. The assets can also be considered as total assets or the subset that represents investments. For example, IRIS ratio number 6 examines Investment Income to Invested Assets where investment assets include cash.

When making comparisons with market rates of return, if book values are used, care is required in the interpretation of the results.

**Exercises**

8. Using the model accounts provided in appendix VII,

   a. calculate as many of the ratios discussed in this section as you can.
   b. list the ratios that are discussed in this section that you are not able to calculate because of missing data items, identifying those missing items.

9. Discuss your views on the results of the calculations from exercise 8, noting your conclusions in the following areas:

   a. What possible concerns or conclusions are suggested by these calculations?
   b. To the extent that these conclusions may be tentative, what further inquiries or investigations might you consider recommending so as to reach a firmer conclusion?

10. Compare the returns provided to your supervisory authority and identify those ratios identified in this chapter that you could calculate using the information provided, and those ratios that you could not calculate as the information is not provided. Does this answer vary between returns that are provided annually and those returns that are provided more frequently?
E. Technical Provisions

This section examines the insurance related liability items that appear in the balance sheet of companies. The nature of insurance is about uncertainty, and the need to make estimates in the face of this uncertainty is particularly relevant in the establishment of the provisions.

The logical place to start is with the Unearned premiums. The mechanism for recognizing the premium as being ‘earned’ is perhaps the least judgmental of all the provisions, so the ratio should be of lower supervisory interest. However, it is still important to check it because movements in the ratio can result from either errors in the data submitted by the company (that would need to be corrected to ensure a robust analysis of other items) or deliberate misstatement (that would be a cause for supervisory intervention). For further background on the mechanisms for establishing this provision see A short elaboration of earned and unearned premium can be found in appendix II.

In some jurisdictions the focus of attention on this ratio may also be less than in others because it is expected that the auditor of the insurance company will have given attention to the calculation of the UPP as part of the audit of the accounts. It is still useful to perform this check, either because the auditor may only be interested in the total business result and the calculations of business lines may be incorrect but offsetting, or simply to gain an assurance that the audit is, in fact, covering the issues adequately. It is important that the insurance supervisor has a clear understanding of the role and activities of the auditors with respect to these issues and gains sufficient comfort that its reliance on the work of the auditors has a reliable basis—rather than simply assuming that, as the work is audited, the figures must be correctly determined.

Once we leave unearned premium, however, the matter becomes less definite. As a result, provisioning practices adopted by companies can vary and there is scope for understatement of provisions that has the effect of overstating profit and solvency. First, turning to unexpired risk, as unearned premium is a function of the premium rates themselves, then the unearned premium provisions will underestimate the actual resources needed to cover future risks if the premium rates are not adequate. Where this is the case, then it is pertinent to consider whether there should be an additional provision made and, if there is such a provision made, whether it is sufficient.

The unearned premium and unexpired risk provisions focus on events that are yet to occur on currently in force policies. Claims provisions, in contrast, relate to events that have happened, ie the claims ‘incurred’, whether or not the policy is still current, where the company still has an obligation that is to be paid ‘outstanding’, and regardless of whether or not a legal acceptance of the claim has taken place.

Claims provisions will vary in their method of estimation, the extent that they involve human judgment, and the extent to which information is more or less available for the assessment of the claim. Claims that are in the final stages of settlement may well have a clear defined outstanding amount that can represent the provision. More gener-

10. This paper is not intended to cover the subject of claims provisions in depth. For a further discussion from a supervisory perspective, refer to the IAIS paper on ‘Quantifying and Assessing Liabilities’ at IAIS 2003b.
ally, however, the ultimate cost of the claim is an estimate. In addition, the company will have claims that have been incurred but not reported (IBNR), so will have no information about these except past experience. But the fact that it is certain that some claims will be reported later, and the need to ensure that the company correctly represents its liabilities, means that it should have these provisions.

Given the subjective nature of establishing claims provisions, then it must be examined closely to ensure that the provisions established can be viewed as adequate. Companies may understate their claims provisions for a number of reasons that can vary from errors or omissions to deliberate attempts to inflate profits (or to avoid presenting a loss). In between these extremes, there is the potential for misplaced optimism or the use of a method that is inappropriate. Alternatively, the actual experience may change or the company may be able to, as a result of careful study and improved procedures, adopt a more accurate estimate than they were able to do in the past. Claims-based ratios will also be influenced by the company claims handling procedures and administrative processes that can alter the timing of claims settlement and influence the ratios.

Where the ratio of Claims paid to claims provisions shows an increasing trend then this may indicate a weakening of the provisions and should be investigated. It may also indicate that the company has been speeding up the claims settlement administration or that there have been some large cases that distorted the trend—but such alternative contentions would need to be supported by some other evidence before they were accepted by the supervisor. Hopefully management would have already investigated such a trend and be able to substantiate the reason.

Similarly, where the ratio of IBNR to reported provisions falls, then the company may be understating the provisions. There may well be valid reasons for this ratio to fall so it should be treated with caution but investigated.

When the ratios that compare the actual claims to the expected claims are materially greater than 100% then this may suggest that the claims experience has deteriorated, and future claims provisions should also show a corresponding increase. Again, the counter position is that claims may simply be being settled more quickly—an argument that the total claims outcome remains largely unchanged and that future payment expectations might actually be reduced. Interpreting this ratio, and the action that may be appropriate, would also be informed by understanding the method used by the company in setting these provisions. Some methods, such as a target overall claim ratio, will automatically take credit for claims being paid earlier, whether or not this is actually the case. Other methods, such as the chain ladder methods, will more gradually reflect both changed experience that is either positive or negative.11

Deficiencies in provisions are of the greatest concern to the supervisor.

11 A treatment of the various methods is beyond the scope of this paper. In the event that a supervisor is inexperienced in understanding these methods, then they should note the trends in the ratios with care and, where they are unstable or show an adverse trend, seek the guidance of more experienced colleagues.
**Unearned premiums**

\[
\left( \frac{UPP}{WP} \right) \times 100\% 
\]

where \( UPP \) is the unearned premium provision at the end of the accounting period; and \( WP \) is the written premium for the same class of insurance in the corresponding accounting period.

The reason for the use of written premium in this case is that the process of ‘earning’ the premium is the link between written and earned premium itself (and, as a result, unearned premium). The ratio can be calculated on a net or gross premium basis in that case, of course, the UPP and the premium must be on the same basis. These rates can be calculated by class of business or for the total portfolio of the company.

**Unexpired risk**

The ratios that have been set out above with respect to profitability will help to identify if classes of business, or the business as a whole, are presenting as unprofitable. If this is the case, the Operating ratio is likely to exceed 100% and the Profit ratios will be negative. Where the business, or business segment, is profitable, then an unexpired risk provision should not be required and no further consideration would be required. If an unexpired risk provision is not established and should be, then the profit result will be artificial.

Examining the Unearned Premium Provision, that is net of expenses, and the Unexpired Risk (if any has been set aside) against the equivalent (net of expenses) Claims ratio will enable an assessment to be made as to whether or not the unexpired risk reserve has adequately reflected recent claim ratio experience.

**Claims paid to claims provisions**

From a theoretical standpoint, if the pattern of reporting and provisioning for claims is stable then the claims provisions will ultimately become claims paid in a consistent process.

\[
\left( \frac{CP}{CProv} \right) \times 100\% 
\]

where \( CP \) is the amount of claim payments in the current accounting period; and \( CProv \) is the claims provision.

The ratio can be calculated on a basis net or gross (of reinsurance) and for the whole of the company, for separate classes, or for business groupings. The provisions
taken can include IBNR or not, and may be calculated using provisions at the start or the end of the accounting period or the average.

Whichever approach is taken, the interpretation of the results will need care. It is best to calculate the ratios at the most detailed class of business level because different classes can be expected to show different behaviors and business volume and mix changes will influence the aggregate company results. For long-tail business, if the information is available, it may also be informative to calculate the ratio separately for each year of claim event.

Note that this ratio needs to be interpreted being aware that claims outstanding provisions should correctly include an allowance for expenses related to claims payments whereas the claims paid will not.

**IBNR to reported provisions**

\[
\left\{ \frac{\text{IBNR}}{\text{CProv}} \right\} \times 100\%
\]

where IBNR is the provision for claims incurred but not reported by the balance-sheet date; and CProv is the total claims provision including IBNR provisions.

In this case, the provisions would be taken from the same balance sheet. The concept behind the ratio is that the total claims including IBNR would, in a stable situation, be made up of a proportion of IBNR that is fairly consistent over time. Traditionally, in the absence of more scientific studies, companies would add a fixed percentage to the reported claims for the IBNR.

**Claims development over the year**

Particularly for long-tail business, companies may report their expected future claim payments from the existing business as well as their past claim payments on the basis of both the year of the occurrence of the claim event and the year (or expected year) of the claim payments. If this is done, then it is possible to examine the claims paid in the latest accounting period compared to those expected when the provisions were determined the previous year. These would be a series of ratios of the form

\[
\left\{ \frac{\text{Actual}}{\text{Expected}} \right\} \times 100\%
\]

where Expected is the predicted figure at the previous report; and Actual is the actual outcome reported.
Under the IRIS system, the claims development is further analyzed as a ratio to equity (ratios numbered 10 and 11\textsuperscript{12}).

\begin{equation}
\left\{ \frac{CProv\prime_1 + CP' + CProv\prime_0}{Equity} \right\} \times 100\%
\end{equation}

where $CProv\prime_0$ is the claims provision at the start of the period (from the previous submission; $CProv\prime_1$ is the claims provision at the end of the accounting period for the same group of business, i.e. it will exclude the business written in the current accounting period; $CP'$ is the claims paid during the period for the same group of business, i.e. it will exclude the business written in the current accounting period; and $Equity$ is the balance sheet equity for the company at the end of the accounting period.

**Alternative claims estimates**

In an ideal situation, the information provided to the supervisor will enable an alternative claims provision estimate to be calculated. It is normal, as data would usually be in a summary form, that more mechanical approaches are used to do this estimate\textsuperscript{13}. As a result, the company should be in a position to make use of more information to establish the appropriate provision.

\begin{equation}
\left\{ \frac{CProv}{Alternative} \right\} \times 100\%
\end{equation}

where $CProv$ is the claims provision reported by the company; and $Alternative$ is the corresponding alternative that may be made in the supervisory office.

For the purposes of IRIS ratio number 12, the deficiency in the provision is compared to the equity of the company. As a result, it needs to estimate the deficiency for the aggregate of the business of the company. This is a useful way to identify the extent of the materiality of the estimated shortfall but should not deter the supervisor from seeking to have any identified shortfall corrected (that would reduce the equity), so that other ratios based on equity will be correctly assessed. The ratio can be sensitive to the method used in determining the alternative estimate, including changes in the business mix of the company or in premium volumes. However, in helping to identify companies that may be of greater supervisory concern, the ratio is considered useful.

\begin{equation}
\left\{ \frac{Alternative - CProv}{Equity} \right\} \times 100\%
\end{equation}

where $Equity$ is the balance sheet equity for the company at the end of the accounting period.

\textsuperscript{12} The IRIS system separately examines the development of the provisioning over a one and a two year period.

\textsuperscript{13} For one approach to making an alternative estimate, refer to the IRIS ratio 12 elaboration in NAIC 2002.
ICP 12B: A Primer on Non-life Insurance Ratios

**F. Assets**

Whilst the liabilities of the company are important, it is also necessary to investigate the asset side of the balance sheet. Assets can be considered to be separated between

- investments of the company;
- amounts owing to the company from third parties, including premiums that have yet to be received from policyholders and brokers;
- other operating assets such as equipment; and
- amounts owing from reinsurers.14

Ultimately, the supervisor is interested in the quality of the asset portfolio, its appropriateness reflecting the nature of the business mix on the liability side of the bal-

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**Exercises**

11. Using the model accounts provided in appendix VII,

   a. Calculate as many of the ratios discussed in this section as you can.
   b. list the ratios that are discussed in this section that you are not able to calculate because of missing data items, identifying those missing items.

12. Discuss your views on the results of the calculations from exercise 11, noting your conclusions in the following areas:

   a. What possible concerns or conclusions are suggested by these calculations?
   b. To the extent that these conclusions may be tentative, what further inquiries or investigations might you consider recommending so as to reach a firmer conclusion?

13. Compare the returns provided to your supervisory authority and identify those ratios identified in this chapter that you could calculate using the information provided, and those ratios that you could not calculate as the information is not provided. Does this answer vary between returns that are provided annually and those returns that are provided more frequently?

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14. When the liabilities are shown in the balance sheet to be before allowance for reinsurance then there will be amounts on the asset side which represent the difference between gross and net (of reinsurance) technical provisions. These would be expected to be large in amount raising the issue of the importance of the credit quality of the reinsurance counter parties.
ance sheet, any potential source of concentration of counterparty risk, and the liquidity of the assets compared to the needs of the company to meet its obligations to policyholders as they fall due.

To gain an understanding of the investments of the company it would be normal to calculate and examine trends in the Asset mix. It will normally be possible to ascertain the extent that the company is exposed to more or less “risky” assets and any changes over time that may be indicative of a change in the company investment policy.

In the normal course, non-investment assets may be more difficult to access for the benefit of policyholders in the event that the company is in difficulty. Consequently, the quality of the investment portfolio needs to be supplemented by considering the extent that the company depends on Investment assets. In observance of the IAIS Principles, the rules in place in the jurisdiction ensure that some assets do not count for solvency purposes at all and it can be useful to examine the extent that the company carries these Inadmissible assets, both because it should be a small percentage of the total as a matter of course and any increase in this extent would reflect a decreasing level of security provided by the total asset base of the company. If the ratio is high, then it would suggest that the company should be asked to provide more detailed information on the nature of these assets and actions being taken to reduce the ratio in the future. Such information may include the periods that various debts have been outstanding (the age of the debts) or details of the nature, terms and security of individual large related-party assets.

With respect to asset concentration, the supervisor will be concerned on two fronts. First, if the counterparty defaults then this would have a significant impact on the insurance company, and second, if the asset is large then it may be difficult to realize (i.e., less liquid). This can even be the case where the exposure is to an equity share that is normally well traded on the exchange. It may be that it is liquid and well traded in normal market conditions, but it may be much more difficult for the insurance company with a large holding to sell the holding than it would be for the smaller investors that represent the day-to-day liquidity. It may be that the ratio is high, then it would suggest that the company should be asked to provide more detailed information on the nature of these assets and actions being taken to reduce the ratio in the future. Such information may include the periods that various debts have been outstanding (the age of the debts) or details of the nature, terms and security of individual large related-party assets.

Similarly, ratios that relate to more general credit quality can be borrowed from the banking analysis. These would address assets that may be defined as ‘non-performing’ or the general structure of ageing of debts. In both cases, the analysis will depend on the information actually provided to the supervisor.

In most circumstances, a well run and growing non-life insurer will be able to manage its Liquidity. This is because it has a flow of new monies from premium income

15. Inadmissible assets can include premiums due but not received, amounts owing from agents or brokers, and assets invested with related parties such as loans to directors or affiliated companies. An asset may be treated as inadmissible by giving it an effective reduced or zero value directly or by requiring that the solvency requirement be increased by the value of the inadmissibility—the effect is the same.

16. Concentration arises when an insurer has one or a small number of large value assets, or several different types of small assets which have the same counterparty which, together, represent a larger amount.
and investment returns that can be reasonably predicted over time and does not have obligations to meet particular calls on cash at short (days) notice. However, there have been instances where companies have found themselves to be in a difficult situation with respect to liquidity.\(^{17}\) An assessment of the situation for each company is, therefore, important.

**Asset mix**

There are many ways that the asset mix can be determined depending on the classification of assets in the reports to the supervisor. It would be normal, in the case of examining the assets that are part of the investment operations, to express them as a percentage of the total investments. For example,

\[
\left( \frac{\text{Equities}}{\text{TotalInvestments}} \right) \times 100\%
\]

(24)

The company would normally consider the market value of the investments when conducting its investment operations regardless of whether or not this is the basis of the values in the balance sheet in the jurisdiction. It is useful, in the case that the balance sheet is not based on market values, for the supervisor to have access to the market values so that asset mix ratios can be calculated on this basis.

Given the potential influence of currency movements on the values of foreign assets, and the fact that the liabilities are usually in local currencies, then it is usual to examine the exposure to foreign exchange risks specifically. A large or increasing level of potential foreign exchange exposure may need to be investigated by finding out the policy toward and extent of hedging that the company adopts.

**Investment assets and other assets**

\[
\left( \frac{\text{TotalInvestments}}{\text{TotalAssets}} \right) \times 100\%
\]

(25)

where \(\text{TotalInvestments}\) is the total of the financial instruments and other investments held as assets of the company at the end of the accounting period; and \(\text{TotalAssets}\) is the corresponding total value of assets at the same point in time.

---

\(^{17}\) One example of a liquidity crisis arose with HIH, an insurer that ultimately failed in Australia in March 2001.
**Inadmissible assets**

\[
\left( \frac{\text{InadmissibleAssets}}{\text{Capital}} \right) \times 100\%
\]

where \text{InadmissibleAssets} would be defined in the rules in the jurisdiction; and \text{Capital} is the balance sheet capital of the company.

It may also be useful to examine particular inadmissible asset groups. For example, increases in the Inadmissible assets to related parties may give rise to concerns about the effective corporate governance of the company within the group. The IRIS ratios (number 9) have shown that the amounts due from agents as a percentage of the company capital is also a particularly useful indicator of potential problems.

**Liquidity**

In a conventional analysis of a manufacturer or other enterprise, two ratios are defined, both dependent on the definition of the terms in the jurisdiction:

- **Current Ratio**: “Current assets” divided by “current liabilities”.
- **Quick Ratio**: similar to the current ratio but excludes the value of inventory or stocks in the current asset calculation.

In the insurance context, however, where the assets of the company are generally more of the nature of investments than holdings of plant and equipment, and inventory is of limited meaning, these ratios are of no value.

In response to this challenge, the IRIS ratio number 8 was developed and is illustrative of the way that a ratio may be developed that is relevant to the jurisdiction. In that case, the total liabilities of the company are taken as the starting point for the numerator, and unearned premiums that are still due from brokers and agents are deducted. This gives adjusted liabilities. Liquid assets are then defined to include those assets that the supervisor is particularly confident will be and will remain liquid. The ratio calculated is then

\[
\left( \frac{\text{AdjustedLiabilities}}{\text{DefinedLiquidAssets}} \right) \times 100\%
\]

18. In the HIH case, it was possible for customers to seek a refund from the company of the unearned part of their premium by canceling the policy before the renewal date. Whilst the company was not compelled to agree to such a refund, monies with brokers and agents that were yet to be received were held up until the matter could be resolved in the courts. As a result, it is sensible to follow the IRIS approach of excluding these monies at least. If there is a contractual right to a defined refund then it may also be prudent to allow for the fact that policyholders may act to seek this refund in the case of the company difficulty becoming widely reported.

19. In the IRIS example, and bearing in mind the USA market situation, then these are considered to be Bonds, Equities, Cash and short term investments (money market instruments etc), and income due from securities (interest dividends etc) and from real estate. In each jurisdiction, an assessment would need to be made as to the certainty of payment and liquidity of assets.
G. Solvency and Capital

Ultimately, the solvency level of an insurer is critical in providing the protection that is sought by the supervisor for the policyholders.

This section discusses some ratios directed specifically at assessing the level of solvency. The quality of the solvency, also important, will have been informed by the analysis of the ratios in earlier sections, particularly with respect to E. Technical Provisions and F. Assets, but also with respect to D. Profitability—Level, Quality and Source as this influences the maintenance of the other elements.

Solvency is a concept that has a number of definitions for an insurer, all of them determined by the perspective of the assessment. First there is the concept of a ‘going concern’ assessment, second, there is the concept of a ‘run-off’ assessment, and third there is the concept of a ‘wind-up’ assessment. The supervisor has to be concerned with all three concepts as all are potentially ‘in play’. This may be different from the perspective of other parties. At the same time, the supervisor is concerned for the interests of the policyholders whereas other parties may be interested to protect the interests of, or at least consider the perspective of, other parties. To this end, the perspective of the supervisor will be influenced by all three of these concepts.

One of the first ‘rules of thumb’ elaborated was the so called ‘kenney rules’. These relate to Premiums and capital. As a useful measure, they are yet to be surpassed for their simplicity—relating the size of the business to the capital available to support it. The ratio, in one form or another, had also found itself into many supervisory re-

**Exercises**

14. Examine and comment on the asset mix, and trends in the changes to it, that you observe for the model accounts provided in appendix VII.

15. Considering the exposure to non-investment assets, has the company reported in the model accounts in appendix VII become more or less secure in your opinion?

16. List the inadmissible assets in your jurisdiction.

17. The assessment of liquidity requires a consideration of the legal and market circumstances of the jurisdiction. In your jurisdiction,

   a. what adjustments might you consider to liabilities to develop a ratio similar to IRIS number 8; and

   b. what assets might you consider appropriate to include in the denominator of such a ratio?
gimes as the basis of the minimum capital rule, expressing premiums and capital in a proportion.

More scientific approaches have been developed, but these rules, as general guidance to conservative and proper management, still have a sense of reality and companies that venture far from these basics do so at their peril.

After initial development of a solvency ratio based on premiums, supervisors sought to enhance this measure by considering the ratio of the capital to the provisions, most particularly the claims provisions. This was in response to the fact that an insurer that was in run-off would not have premium income and, therefore, in the absence of a second requirement, would not otherwise have a capital requirement.

Further analysis of the solvency position is achieved by examining the trends in the Solvency margin, the Solvency coverage, and in the case of more complicated capital systems, the Quality of capital.

This analysis may well focus firstly on checking that the company complies with the requirements of the law (ie that the Solvency coverage is greater than 100%). However, a deteriorating trend, even where there is still legal compliance, is of concern and the reasons will have been informed by the analysis already conducted above in other areas. A sound analysis seeks to both understand the past trends and their reasons as well as the future prospects for this trend. In this way, a need for additional capital raising can be anticipated.

**Premiums and capital**

These ratios can use gross or net (of reinsurance) premiums and written or earned premiums.

First of all, with respect to $GPW$—Gross Premium Written,

\[
\frac{Capital}{GPW} \times 100\%
\]

or

\[
\frac{GPW}{Capital} \times 100\%
\]

Equation 29 is the first ratio in the IRIS set. There it is considered that a ratio in excess of 9 would be a matter of grave concern. Whilst companies may well reinsure much of the risk they write at these levels, the administrative load of generating the business and servicing it remains.

Then, with respect to $NPW$—Net Premium Written,

\[
\frac{Capital}{NPW} \times 100\%
\]
or

\[
\frac{NPW}{Capital} \times 100\%
\]

Equation 31 is the second ratio in the IRIS set. There it is considered that a ratio in excess of 3 would be a matter of grave concern. For an insurer to be close to both of these thresholds then it would be having to cede 2/3 of the risk written that is also high (refer to Cession rates above).

Further, the ratios of capital or provisions to net earned premium may ultimately be part of the solvency margin definition.

**Technical provisions and capital**

\[
\left( \frac{Capital}{Provisions} \right) \times 100\%
\]

where Provisions is the technical provisions; and Capital is the capital in the balance sheet at the same point in time.

It would be usual to calculate this ratio based on provisions net of reinsurance. In the traditional capital type formula, the provisions would focus on the claims-related provisions including IBNR.

**Solvency margin**

The solvency margin is defined by the IAIS (see IAIS 2005) as the surplus of assets over liabilities. Because these terms are frequently used in an imprecise manner, the IAIS definition refers to ‘available solvency (margin)’ or ‘available surplus capital’ first being the actual solvency margin that the company holds, and ‘required solvency margin’ or ‘required surplus’ being the level of the solvency margin required in the solvency regime of the jurisdiction.

Available solvency can be determined fundamentally as total assets less total non-capital liabilities. It is also possible to reduce the available solvency by excluding some assets that might be judged as not being available or by including some additional liabilities that might be considered less available to absorb losses.\(^\text{20}\) In this way, the available solvency definition may include some adjustments after these considerations.

In different jurisdictions there are different forms that the required solvency margin takes. Two major forms are the index based methods where the required margin is defined in terms of the greater of several calculations along the following lines:

\(^{20}\) For example, assets that are inadmissible or capital that is of a lower quality such as, where permitted, convertible notes or subordinated debt or other instruments that are sometimes considered to have a capital-like quality.
where $F$ is a fixed minimum figure; and $K_1$ and $K_2$ are factors, usually different, to be applied to the index item.

A more complex approach can split the premiums and claims factors so that different factors can be applied to different classes of business based on the perceived risk.

Another form, more often distinguished with the name 'Risk Based Capital' also applies factors to various values but may add them rather than take a 'greater of' approach. Further complication still can be added by combining these 'capital charges' following the statistical theory by squaring the values before adding them and then taking the square root of the result.

For the purposes of this paper, it needs only to be recognized that the most basic versions of the formula have emerged from the ratio analysis, particularly of premiums and claims provisions, and that the student should know how the solvency margin is determined in their own jurisdiction under the insurance laws.

**Solvency coverage**

Having determined both the available solvency and the required solvency, then the solvency coverage ratio is

$$ \text{Solvency Margin} = \text{Max} \left\{ \frac{F}{K_1 \cdot \text{Premium}}, \frac{1}{K_2 \cdot \text{ClaimsProvisions}} \right\} $$

Given that the "Required" solvency is a legal obligation on the company, then a ratio that is less than 100% indicates a breach where the required solvency margin is set out in clear terms. In some jurisdictions, a higher value is considered as appropriate and so a figure below, for example, 200% may be a trigger for supervisory intervention.

**Quality of capital**

In some solvency systems, the capital instruments that can count for solvency purposes are limited to the equity of the company. In others, there is some consideration or allowance for other instruments. In addition, depending on the accounting regime in the jurisdiction, products such as financial reinsurance can have the effect of providing effective capital support for the company. It is beyond the scope of this paper to set out the identification of these elements in detail.

Rather, it is indicated that a good analysis of the effects and trends in these elements will be needed if they exist for the company. Supervisors approach second tier types of capital instruments and financial reinsurance as lower quality security for policyholders and, in the extreme, consider that an increase in the use of financial reinsurance in
particular may be a sign that the company management considers its capital position to be particularly weak. Also, a disproportionate dependency on financial reinsurance may translate to a dependence on the continuing viability of the reinsurance company and its willingness to support the insurer.

Ratios that may be considered would be the proportions of such capital of lower quality expressed in terms of either or both of the available solvency margin or the required solvency margin. By way of example, in the United States of America the IRIS system includes a ratio of ‘surplus aid’ (through reinsurance) to capital as ratio number 4 and, in this case, they consider that not more than 15% of the capital should be in this form.

Ultimately, where the judgment is that the available solvency margin is of a lower quality, then it may be that other ratios could be revisited using a capital or solvency margin value that is adjusted by excluding the ‘impaired’ amounts.

### Exercises

18. Using the model accounts provided in appendix VII,

   a. Calculate as many of the ratios discussed in this section as you can.
   b. List the ratios that are discussed in this section that you are not able to calculate because of missing data items, identifying those missing items.

19. Discuss your views on the results of the calculations from exercise 18, noting your conclusions in the following areas:

   a. What possible concerns or conclusions are suggested by these calculations?
   b. To the extent that these conclusions may be tentative, what further inquiries or investigations might you consider recommending so as to reach a firmer conclusion?

20. Compare the returns provided to your supervisory authority and identify those ratios identified in this chapter that you could calculate using the information provided, and those ratios that you could not calculate as the information is not provided. Does this answer vary between returns that are provided annually and those returns that are provided more frequently?
H. Other More Advanced Elements

The view of other stakeholders

An insurance company may, no matter how unlikely, have the need to raise capital in the future. Sometimes this can be anticipated through studious business planning but other times, if the need has arisen from sudden adverse experience, it is more difficult to anticipate. Even though supervisors are oriented toward the protection of the interests of the policyholders rather than the shareholders, they continue to have a very necessary interest in the attitude of the shareholders and the effectiveness of management as reflected in the shareholder returns.

In addition, it has been found that some of these shareholder-oriented ratios can act as effective early warning indicators of the company becoming financially distressed.

The ability to carry out such analysis may depend on whether companies are listed. It will not be as practical to consider all the analysis here where the companies are privately owned or are part of a larger group.

Return on capital

Profit was discussed at some length in an earlier section (refer to D. Profitability—Level, Quality and Source) where ratios tended to be calculated with reference to the volumes of business measured by premiums.

The Return on Capital, in contrast, reflects the level of capital that the shareholders have subscribed and the return directed at them. As a result, profit is usually taken as operating profit after tax.

\[
\text{Return on Capital} = \frac{\text{Profit}}{\text{Capital}} \times 100\%
\]

where Profit is the profit after tax in the current accounting period; and Capital is the balance sheet capital.

IRIS ratio number 7 uses a balance sheet approach (the change in the capital from one year to another) to express this concept. With such an approach, it may be suggested that consideration be given to the effect of any adjustments that may be made in determining the available solvency margin, such as the exclusion of inadmissible assets. From a supervisory perspective, this is an enhancement to the basic ratio.

Some analysts will consider long-term debt as equivalent to equity, in effect, and include this in the calculations. Such an approach generally reflects the perspective of the stakeholders the analyst is focusing on. As such, they would define profit as being after tax but before interest, and capital as being shareholders equity and long-term debt. This then gives a form of return on capital measure that might be a better indicator of the company’s effectiveness in using its resources. By comparing return on capital...
including long term debt to return on equity excluding long term debt, it is possible to determine whether an insurer’s financial leverage has benefited shareholders. If the return on equity is higher than the return on capital, the company’s long term debt has provided a positive return to shareholders.

This measure of the effectiveness of leverage can also be useful in assessing a proposed debt issue from the point of view of the supervisor. If a debt issue will be detrimental to shareholders then it may be an indication that the company is approaching its funding needs with desperation.

**Other share price performance measures**

Additionally, shareholders may be particularly interested in dividends and debt holders are particularly interested in the security of their interest payments. Where there is a market for the asset, then the holders of these instruments will also be interested to assess the extent that they are actively traded (liquid), and to be informed by the sentiment of the market toward the company. Some measures are included in appendix VI for further reference.

**More advanced sources**

Share market analysts and ratings agencies also carry out similar analysis as is alluded to in this paper. Sometimes their perspective is targeted slightly differently but the approach is fundamentally the same. Market analysts may be more oriented toward the equity issued by the company and therefore are more focused on profitability and dividends than is the case with supervisors who tend to be more focused on the company solvency from the policyholder protection perspective. Ratings agencies can sometimes be between these two. Ratings agencies are often focusing on the insurer’s ability to service debt.

In the interests of improved transparency, ratings agencies have published elaborations of their approaches in this area. Whilst these tend to represent refinements to the basic ratios, it may be of interest for further reading (see Moody's Investor Services 2000 and 2003).

In addition, through the application of financial theory on markets, it is possible to determine a “default” probability using market data where an insurer issues both debt and equity in the listed markets. The elaboration of this method is beyond the scope of this paper. However, in jurisdictions where this information is available then the trend in the default probabilities arising from this type of analysis can be considered as part of a review of the insurer and its prospects.

Section J. References also includes some academic papers which may be of interest when considering how the analysis of ratios as a tool can be enhanced. The main focus
of these studies is to identify the ratios that perform better as indicators than others. US data tends to be used in these papers as it is publicly available and has a large number of observations, increasing statistical validity.

**A stress test or scenario test**

There has been considerable interest in the supervisory world in the greater use of stress testing or scenario testing. At one level, a ratio could be considered to be providing the same information as an equivalent stress test.

For example, if we consider the ratio of share market investments to the capital of the company then this could also be considered as a sort of test. If an insurer has a ratio that is less than 100% then this suggests that the whole of the share portfolio could be written off in value and the company would still have positive capital. If share values were to fall by 20% then companies with a ratio of shares to their capital of 500% or more could be expected to be in a position where their capital was eroded in full.

But there are problems with this analysis. First, there are several assumptions that are implicit in the approach that may not be true in practice. In this example, the assumption is that a 20% fall in the value of shares in the marketplace would translate to a 20% fall for the company. This may not be true. In the case of companies who have book value assets then the effect of a share market fall will vary from company to company. Companies with a smaller margin between book value and market value are more likely to have to write down their asset values than those with a larger margin. Second, companies may not have a fully representative portfolio. Third, companies may not see such a linear effect due to the use of derivatives. And fourth, company liabilities are assumed to be constant in such an environment—something that may not be true.

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**Figure 2: Diagrammatic Representation of a Basic Asset-based Test**

- As asset values fall...

  - Breach of solvency margin
  - Assets less than liabilities

  - “Free assets”
  - Assets needed to meet solvency margin
  - Assets needed to meet policyholder obligations
Another problem, however, is the fact that the threshold may not be the most meaningful one.

As asset values fall, the supervisor may be interested in earlier points of “stress” such as the point where the company may breach a control level such as the statutory solvency margin.

Another simple test that can be done is to consider the prospective growth of the company compared to the growth of its resources. This involves constructing a calculation that examines the question ‘how much can the premium grow before the company would need to raise capital?’ The calculation requires assumptions such as the continuing proportion of the business that would be reinsured and the rate of continuing profitability of that business and the rate of expenses and the rate of return on assets. If, however, it would seem that the company would have to achieve a sharp change in one of these parameters to continue to grow at the current rate and still avoid a capital injection then this would be a concern. The existence of a strategy from the company to reduce costs by improved efficiency might need to be examined in some detail before the supervisor could accept this as a solution to a risk that the continuing capital obligations may not be met.

For companies that are most likely to need to raise capital in the nearer term, the supervisor is likely to be concerned about whether or not the company is prepared to do so, and whether or not the shareholders are likely to provide that capital.

These examples are provided to illustrate some possibilities that may be explored. Others that may be considered, for example, are to examine the effect of such changes as, for example, a 10% increase in claims provisions, a large catastrophe event, the loss of a major line of business, increased reinsurance rates, etc. This would aid understanding of the type and size of events that could create a significant impact on the insurer’s financial position.
Exercises

21. Using the model accounts provided in appendix VII, estimate the extent that the company could withstand the following before it becomes insolvent, using the latest available figures reported:

   a. A fall in the value of the stock market index;
   b. A rise in the level of longer term interest rates;
   c. A change in foreign exchange rates;
   d. An increase in the claims provisions for Class B.

Where you have to make assumptions to answer these questions, note those assumptions carefully.
I. Summary Concluding Remarks

In this paper a set of ratios have been presented and discussed to assist in the analysis of a non-life insurer's financial and statistical returns. Along with qualitative analysis, these ratios can be used to assist in forming a view as to the strength of the insurer’s operations and financial standing. Ultimately, the objective for the supervisor is to form a view as to the extent to which policyholders are protected and, if necessary, whether any intervention on the part of the supervisor is required.

This analysis may raise concerns which are more or less serious and therefore lead to more or less significant intervention, ratios may not be conclusive in all circumstances. It may be that further inquiry is the sensible course of action so as to determine the underlying cause of the trends in the ratios that are observed. In other cases, for example where there is a breach of a statutory requirement, then action may be justified purely on the basis of the analysis.
J. References

Core references


Notes on advanced methodologies


Academic research on ratios and their predictive capacity


Appendix I: Definitions

a) Class of business
The defined sub-segments of the total insurance business used for reporting purposes. Ideally, these definitions assist in separating the total business into groupings that assist in the statistical reporting in the sector and to the analysis of the resulting statistics.

b) Claims provision
Amount set aside on the balance sheet to meet the total estimated ultimate cost to an insurer of settling all claims arising from events that have occurred up to the end of the reporting period, whether reported or not, less amounts already paid in respect of such claims. (Source: IAIS Glossary).

c) Claims incurred but not reported
Claims resulting from accidents that have taken place but where the company has not yet received notice or report of the claim. [Related definitions: IBNR provision] (Source: IAIS Glossary).

d) Earned premium
Premium for protection that has been provided. When a premium is paid in advance for a policy period, the company “earns” a portion of that premium only as time elapses during that period. (Source: IAIS Glossary)

That is,

\[ EP = P + UPP_0 - UPP_1 \]

where \( EP \) is the earned premium in the current accounting period; \( P \) is the premium income for the same class of insurance in the corresponding accounting period; \( UPP_0 \) is the provision for unearned premiums at the start of the period; and \( UPP_1 \) is the provision for unearned premiums at the end of the period.

e) Gross (of reinsurance) premium
In this paper, gross premiums refer to premiums that includes the provision for anticipated claims (the pure premium) before the deduction of allowances for the effects of reinsurance and for the anticipated expenses (loading).

f) ‘Incurred But Not Reported’ IBNR provision
Provision for claims incurred but not reported by the balance–sheet date. That is, it is anticipated that there would be a number of policies that have, but for the advice of the claim to the insurer, occurred and therefore are likely to result in a liability on the insurer. The magnitude of this provision can be expected to reduce as the time since the insurance risk on the contract expired extends. The magnitude is also likely to vary
depending on the type of insurance risk covered by any particular class of insurance contract. (Source: IAIS Glossary).

g) **Incurred Claims/Losses**
Claims actually sustained during a fixed period, usually a year. Incurred claims are customarily computed by the formula: claims paid during the period, plus outstanding claims at the end of the period, less outstanding claims at the beginning of the period. (Source: IAIS Glossary). That is,

\[
IC = C + oc_0 - oc_1
\]

where \( IC \) is the incurred claims in the current accounting period; \( C \) is the claims paid for the same class of insurance in the corresponding accounting period; \( oc_0 \) is the outstanding claims [claims provisions] at the start of the period; and \( oc_1 \) is the outstanding claims [claims provisions] at the end of the period.

h) **Net Premiums**
In this paper, net premiums refer to gross premiums after the deduction of allowances for the effects of reinsurance but including allowance for the anticipated expenses.

i) **New Business premiums**
The total premiums (gross or net as defined but usually written rather than earned) relating to new policies, and increases due to the addition of benefits on existing policies.

j) **Permissible claim ratio**
The maximum percentage of premium income that can be expended by the company to pay claims without loss of profit. (Source: IAIS Glossary).

k) **Premium**
the payment, or one of the periodical payments, a policyholder agrees to make for an insurance policy. (Source: IAIS Glossary).

l) **Provision for unearned premiums**
amount on the balance (sic) sheet representing that part of premiums written that is to be allocated to the following financial year or to subsequent financial years. (Source: IAIS Glossary).

m) **Provision for unexpired risks**
Amount set aside on the balance sheet in addition to unearned premiums with respect to risks to be borne by the insurer after the end of the reporting period, in order to provide for all claims and expenses in connection with insurance contracts in force in
excess of the related unearned premiums and any premiums receivable on those contracts. (Source: IAIS Glossary).

n) Reinsurance
Insurance placed by an underwriter in another company to cut down the amount of the risk assumed under the original insurance. (Source: IAIS Glossary).

o) Reinsurance Expense
The amount paid out by way of reinsurance premiums ceded.

p) Solvency
Ability of an insurer to meet its obligations (liabilities) under all contracts at any time. Due to the very nature of insurance business, it is impossible to guarantee solvency with certainty. In order to come to a practicable definition, it is necessary to make clear under which circumstances the appropriateness of the assets to cover claims is to be considered, e.g. is only written business (run–off basis, break–up basis) to be considered, or is future new business (going–concern basis) also to be considered. In addition, questions regarding the volume and the nature of an insurance company’s business, which time horizon is to be adopted, and what is an acceptable degree of probability of becoming insolvent should be considered. (Source: IAIS Glossary).

q) Solvency margin
Surplus of assets over liabilities. (Because these terms are frequently used in an imprecise manner, the glossary refers to available solvency (margin) or available surplus capital and required solvency margin or required surplus.) (Source: IAIS Glossary).

r) Solvency requirements
The whole set of statutory requirements or rules as regards the required solvency margin (RS) and eligible capital elements to cover the margin, and includes the performance of the solvency test to prove compliance with these requirements. (Source: IAIS Glossary).

s) Technical provision
Amount set aside on the balance sheet to meet liabilities arising out of insurance contracts, including claims provision (whether reported or not), provision for unearned premiums, provision for unexpired risks, life assurance provision and other liabilities related to life insurance contracts (e.g. premium deposits, savings accumulated over the term of with–profit policies). (Source: IAIS Glossary).

t) Underwriting
The process where an insurance company determines whether or not and on what basis it will accept an application for insurance. (Source: IAIS Glossary).
u) Unearned premium
That portion of the original premium where protection has not yet been provided because the policy still has some time to run before expiration. A property and liability insurer must carry unearned premiums as a liability on its financial statement. (Source: IAIS Glossary).

v) Written premiums
The premiums on all policies that an insurer has issued in some period of time, as opposed to “earned premiums”. (Source: IAIS Glossary).
Appendix II: A Short Elaboration of Earned and Unearned Premium

It would be normal to expect that an insurer with a reasonable sized portfolio would write business fairly evenly over the accounting year and for the risks associated with the policies to be equally likely to occur at any time over the policy term. The resulting process of earning the premium can be considered to be the Written Premium less an allowance for expenses then proportionally allocated over the life of the contract.

The most basic version of this formula that has been applied, and is still required in some laws in some jurisdictions, is the ‘40% rule’. That is

(38) \[ UPP = 40\% WP \]

In other words, if it is assumed that 20% of the premium is used up in expenses and the remaining 80% provides for the risk over the year, and, on average policies are half way through their policy period, then the UPP would be 40% of the premium.

On this basis, it would appear that a ratio of UPP to written premium that is less than 40% would be a concern and a cause for further investigation. Where the 40% method is a requirement, even a minimum requirement, under the law then such a result would represent a breach.

Where the business is written over the full year, but the volume is growing or declining, then this will effect the UPP calculation. As a result, other methods that make allowance for variable premium volumes were developed.

For example, the business in each period within a year is divided up and treated as if it were uniformly written over that particular period. The ‘1/8ths’ method applies when the periods are in quarters (ie the policies written in the first quarter of the past year would have, on average 1/8th of a year still to run and the second quarter would have 3/8ths and so on). A monthly set of periods would consider the weightings to be 1/24th, 3/24ths, etc. As can be seen, this method still considers that the exposure on each policy is evenly spread over the policy year.

Circumstances that may give rise to unusual results are where business is written in particular seasonal periods of the year, for example, reinsurance treaty business, or where the business growth is influencing the result. By way of example, Figure 4 shows an example where the premium is growing at a compound rate of 2% per month. A 20% expense rate is assumed, consistent with the 40% method. As can be seen, the UPP is higher by 4% of the value that would arise from the 40% method.

Other circumstances that may give rise to unusual results are where the risk itself is not uniformly distributed over the policy term, for example, certain catastrophic lines of business where the propensity for the disaster event is seasonal. The ratio can also be distorted if there are multi-year periods covered by policies. The relevance of the implied expense assumption can be compared to the actual expense rate (refer Expense ratio).
As a result, companies should ultimately consider the pattern of risk over each and every policy separately, and determine the un-earned portion at the balance date. Such an approach would require computerization of the calculations.

**Figure 4: Example of 1/24ths Method Compared to 40% Method**

<table>
<thead>
<tr>
<th>Month</th>
<th>Premium written</th>
<th>Net, after expenses</th>
<th>Unearned portion at end of year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$100,000</td>
<td>$80,000</td>
<td>1/24</td>
</tr>
<tr>
<td>2</td>
<td>$102,000</td>
<td>$81,600</td>
<td>1/8</td>
</tr>
<tr>
<td>3</td>
<td>$104,040</td>
<td>$83,232</td>
<td>5/24</td>
</tr>
<tr>
<td>4</td>
<td>$106,121</td>
<td>$84,897</td>
<td>7/24</td>
</tr>
<tr>
<td>5</td>
<td>$108,243</td>
<td>$86,595</td>
<td>3/8</td>
</tr>
<tr>
<td>6</td>
<td>$110,408</td>
<td>$88,326</td>
<td>11/24</td>
</tr>
<tr>
<td>7</td>
<td>$112,616</td>
<td>$90,093</td>
<td>13/24</td>
</tr>
<tr>
<td>8</td>
<td>$114,869</td>
<td>$91,895</td>
<td>5/8</td>
</tr>
<tr>
<td>9</td>
<td>$117,166</td>
<td>$93,733</td>
<td>17/24</td>
</tr>
<tr>
<td>10</td>
<td>$119,509</td>
<td>$95,607</td>
<td>19/24</td>
</tr>
<tr>
<td>11</td>
<td>$121,899</td>
<td>$97,520</td>
<td>7/8</td>
</tr>
<tr>
<td>12</td>
<td>$124,337</td>
<td>$99,470</td>
<td>23/24</td>
</tr>
<tr>
<td>Total</td>
<td>$1,341,209</td>
<td>$1,072,967</td>
<td></td>
</tr>
</tbody>
</table>

Compared to 40% $536,484
Additional Requirement $21,080
...an extra... 4%
Appendix III: Examples of Defined Classes of Business

It has been noted that the provision of data to the supervisor and its analysis can benefit from separating the total business into certain defined classes. The following examples have been provided to illustrate the sorts of approaches taken to this issue in some jurisdictions. The actual definitions of each class will be consistent within the jurisdiction but may be different from jurisdiction to jurisdiction.

The United Kingdom adopts the European Union classification for non-life direct insurance business. This breaks down the insurance business into 18 classes: (1) Accident; (2) Sickness; (3) Land Vehicles; (4) Railway Rolling Stock; (5) Aircraft; (6) Ships; (7) Goods in Transit; (8) Fire & Natural Forces; (9) Damage to Property; (10) Motor Vehicle Liability; (11) Aircraft Liability; (12) Liability for Ships; (13) General Liability; (14) Credit; (15) Suretyship; (16) Miscellaneous Financial Loss; (17) Legal Expenses; and (18) Assistance.

These are then collected into 8 groups for accounting purposes: (1) Accident and Health [classes 1 & 2]; (2) Motor [1, 3, 7 & 10]; (3) Marine and Transport [1, 4, 6, 7 & 12]; (4) Aviation [1, 5, 7 & 11]; (5) Fire and other damage to property [8 & 9]; (6) Liability [10, 11, 12 & 13]; (7) Credit and Suretyship [14 & 15]; and (8) General [all classes].

[(9), (10) and (11) is reinsurance business].

In Canada, an agreed set of classes has been determined that defines (1) Accident and Sickness; (2) Aircraft; (3) Automobile; (4) Boiler and Machinery; (5) Credit; (6) Credit Protection; (7) Fidelity; (8) Hail; (9) Legal Expense; (10) Liability; (11) Marine; (12) Mortgage; (13) Other; (14) Property; (15) Surety; and (16) Title.

In South Africa, the Financial Services Board adopts (1) Motor; (2) Property; (3) Fire; (4) Marine; (5) Miscellaneous; (6) Accident and Health; (7) Engineering; and (8) Liability.

In Australia, the following breakdown for direct non-life insurance business applies: Aviation; Compulsory Third Party Motor Insurance; Commercial Motor Vehicle; Consumer Credit Insurance; Domestic Motor Vehicle; Employers’ Liability; Fire and Industrial Special Risks; Houseowners / Householders; Marine; Mortgage, Other (e.g. fidelity guarantee, trade credit), Other Accident, Professional Indemnity, Public and Product Liability and Travel. For reinsurance business the categories facultative, proportional and excess of loss are used.
Appendix IV: Short case study of compulsory third party motor insurance premium rates in New South Wales, Australia

Compulsory Third Party Motor Insurance in New South Wales (referred to as CTP or 'greenslips' after the color of the standard contract) must be purchased by all who have a registered vehicle in the state. The benefits are defined in the law. It is permissible for companies licensed to issue the product to differentiate the premium between each other subject to actuarial certification and limited permissible loadings for lower and higher risk drivers.

Information on the average premium per policy is shown in Figure 5 for standard class metropolitan drivers and also for all policies. There was a major change in the structure of the benefits set out in the law that gave rise to the stepped fall in rates at the end of 1999.

Note: Figures exclude the goods and services tax (GST).
Source: New South Wales Motor Accident Authority.
Appendix V: Sample separation of underwriting account elements

This example shows the separation of the Underwriting Account between the Gross, Reinsurance, and Net elements so as to identify the underlying actual performance of the company. It can be seen, in this case, that the overall positive result is entirely as a consequence of the effect of the reinsurance that the company had in place, and particularly the claims element of the reinsurance arrangements to a far greater extent than the reinsurance commissions.

### Figure 6: Elements of the Underwriting Account

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Gross Account</th>
<th>Reinsurance Account</th>
<th>Net Account</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Gross Written Premium</td>
<td>100,000</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Reinsurance Premiums Paid/Reinsurance Expense</td>
<td>20,000</td>
<td>20,000</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Reinsurance UP at start of year</td>
<td>7,000</td>
<td>7,000</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Reinsurance UP at end of year</td>
<td>8,000</td>
<td>8,000</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Reinsurance Earned Expense</td>
<td>B+C-D</td>
<td>19,000</td>
<td>19,000</td>
</tr>
<tr>
<td>F</td>
<td>Net Written Premium</td>
<td>AB</td>
<td>80,000</td>
<td>80,000</td>
</tr>
<tr>
<td>G</td>
<td>Gross UP at start of year</td>
<td>36,000</td>
<td>36,000</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Gross UP at end of year</td>
<td>40,500</td>
<td>40,500</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Gross Earned Premium</td>
<td>A+G-H</td>
<td>95,500</td>
<td>95,500</td>
</tr>
<tr>
<td>J</td>
<td>Net UP at start of year</td>
<td>GC</td>
<td>29,000</td>
<td>29,000</td>
</tr>
<tr>
<td>K</td>
<td>Net UP at end of year</td>
<td>HD</td>
<td>32,500</td>
<td>32,500</td>
</tr>
<tr>
<td>L</td>
<td>Net Earned Premium</td>
<td>HJK+ABCDG+H+D+AE</td>
<td>76,500</td>
<td>76,500</td>
</tr>
<tr>
<td>M</td>
<td>Gross Claims Paid</td>
<td>72,000</td>
<td>72,000</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Gross Claims Provisions at start of year</td>
<td>25,000</td>
<td>25,000</td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>Gross Claims Provisions at end of year</td>
<td>30,000</td>
<td>30,000</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>Gross Incurred Claims</td>
<td>M+O-N</td>
<td>77,000</td>
<td>77,000</td>
</tr>
<tr>
<td>Q</td>
<td>Reinsurance Recoveries</td>
<td>18,000</td>
<td>18,000</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Reinsurance Recoverables at start of year</td>
<td>6,000</td>
<td>6,000</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Reinsurance Recoverables at end of year</td>
<td>5,200</td>
<td>5,200</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>Reinsurance Incurred Recoveries</td>
<td>Q+S-R</td>
<td>17,200</td>
<td>17,200</td>
</tr>
<tr>
<td>U</td>
<td>Net Claims Paid</td>
<td>MQ</td>
<td>54,000</td>
<td>54,000</td>
</tr>
<tr>
<td>V</td>
<td>Net Claims Provisions at start of year</td>
<td>NR</td>
<td>19,000</td>
<td>19,000</td>
</tr>
<tr>
<td>W</td>
<td>Net Claims Provisions at end of year</td>
<td>OS</td>
<td>24,800</td>
<td>24,800</td>
</tr>
<tr>
<td>X</td>
<td>Net Incurred Claims</td>
<td>U+W-V</td>
<td>59,800</td>
<td>59,800</td>
</tr>
<tr>
<td>Y</td>
<td>Gross Expenses</td>
<td>20,000</td>
<td>20,000</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>Reinsurance Commissions Received</td>
<td>4,500</td>
<td>4,500</td>
<td></td>
</tr>
<tr>
<td>AA</td>
<td>Net Expenses</td>
<td>YZ</td>
<td>15,500</td>
<td>15,500</td>
</tr>
<tr>
<td>AB</td>
<td>Gross Underwriting Result</td>
<td>IP+Y</td>
<td>(1,500)</td>
<td>(1,500)</td>
</tr>
<tr>
<td>AC</td>
<td>Reinsurance Underwriting Result</td>
<td>ETZ</td>
<td>(2,700)</td>
<td>(2,700)</td>
</tr>
<tr>
<td>AD</td>
<td>Net Underwriting Result</td>
<td>LXA</td>
<td>1,200</td>
<td>1,200</td>
</tr>
</tbody>
</table>

| Loss Ratios | 81% | 91% | 78% |
| Expense Ratios | 20% | 23% | 19% |
| Combined Ratios | 101% | 113% | 98% |
| Profit Ratios | 81% | 91% | 78% |

Underwriting Result
Appendix VI: Sample of other share price performance measures

In the text, there is reference to some additional share market based measures. As an indication, measures that may be calculated and reported by analysts include:

- **Dividend yields** – the rate of return to the shareholder represented by the dividends paid by the company;
- **Dividend payout ratios** – the proportion of the (net of tax) profit that it paid as a dividend in contrast to being added to retained earnings within the company. A high ratio may indicate that the dividend may not always be sustained and a low ratio may cause shareholders to be concerned that the retained capital is being put to effective use;
- **Interest Coverage** – the ratio of the interest payments to the earnings available to make these payments (profit before interest and, where the interest is tax-deductible, before tax);
- **Measures of the stability of the company earnings or earnings growth** – the more volatile that an insurer’s earnings are the less security of continuing dividend or interest payments if the payout / coverage ratio is also high;
- **Liquidity or turnover measures in the market**, such as the average spread between buying and selling offers, the turnover as a percentage of the total stock issued, and the extent that significant shareholders have blocks of the stock – for example, the proportion of the stock held by the top 20 shareholders;
- **Price Earnings ratios** – the ratio of the stock price compared to the actual earnings per share. A low P/E multiple may indicate a poor sentiment for the company or suggest a stock is potentially undervalued.
- **Price to ‘book value’ ratios** – the stock price divided by the book value (the value of each share as reported in the company accounts) – that should usually be greater than 1, otherwise the market is considering that the company is worth less than reported. The more that the company is perceived to be generating value from its business the higher the ratio. With a low ratio, the market is suggesting that the company would do better to sell the assets and liquidate the operations. Of course, book values may be more or less conservative in the way that they are determined.
- **Highs and lows and trading ranges** can be adjusted to provide an indicator of the recent performance of the stock (eg by comparing the price to the highest of lowest price seen in a prior defined period such as one year).
- **Share price performance** can be measured in terms of percentage change in price, but it is also useful to compare this to other companies in the same sector or indexes prepared for the market (relative performance). Investors may indicate their preference between companies in a sector or a more general sentiment about the sector as a whole.
Appendix VII: Model company accounts

The following set of illustrative insurance accounts is developed to provide a simple example. These accounts assume:

- All premiums are payable annually at the commencement of the policy term. That is, premium written is equal to premium income.
- Company claims provisions are established using run-off triangle methods and are not discounted;
- Assets are taken to be at book value or market value as shown (the item “increase or decrease in value of investments” applies in a market value context but would be read as “realized gains or losses” in a book value example for the exercises).
- Information on the assumed claims experience is shown in run-off triangles but is provided here for each year on a net of reinsurance basis only for the purpose of the exercises.
- All monetary amounts shown in the following table are in $’000s. Other statistics such as numbers of policies are in individual units.
## Figure 7: Sample Insurance Accounts, by Class

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross written premium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct business: new business</td>
<td>2,233</td>
<td>1,117</td>
<td>3,350</td>
<td>2,800</td>
<td>1,500</td>
<td>4,300</td>
<td>3,672</td>
<td>1,870</td>
<td>5,542</td>
</tr>
<tr>
<td>New business represented by number of policies</td>
<td>4,557</td>
<td>4,060</td>
<td>8,617</td>
<td>5,589</td>
<td>5,597</td>
<td>11,186</td>
<td>7,418</td>
<td>7,192</td>
<td>14,610</td>
</tr>
<tr>
<td>Direct business: Renewals</td>
<td>7,767</td>
<td>3,883</td>
<td>11,650</td>
<td>7,500</td>
<td>3,750</td>
<td>11,250</td>
<td>8,034</td>
<td>4,095</td>
<td>12,129</td>
</tr>
<tr>
<td>Renewals represented by number of policies</td>
<td>15,851</td>
<td>14,122</td>
<td>29,973</td>
<td>14,970</td>
<td>13,993</td>
<td>28,963</td>
<td>16,230</td>
<td>15,750</td>
<td>31,980</td>
</tr>
<tr>
<td>Result</td>
<td>10,000</td>
<td>5,000</td>
<td>15,000</td>
<td>10,300</td>
<td>5,250</td>
<td>15,550</td>
<td>11,706</td>
<td>5,965</td>
<td>17,671</td>
</tr>
<tr>
<td>Result represented by number of policies</td>
<td>20,408</td>
<td>18,182</td>
<td>38,590</td>
<td>20,559</td>
<td>19,590</td>
<td>40,148</td>
<td>23,648</td>
<td>22,942</td>
<td>46,591</td>
</tr>
<tr>
<td>Reinsurance premium ceded / reinsurance expense</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reinsurance premium</td>
<td>2,500</td>
<td>1,750</td>
<td>4,250</td>
<td>2,884</td>
<td>1,733</td>
<td>4,617</td>
<td>3,863</td>
<td>2,326</td>
<td>6,189</td>
</tr>
<tr>
<td>Reinsurance commission received</td>
<td>625</td>
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Liabilities

Technical provisions
- Gross outstanding claims provisions: 4,175, 2,087, 6,262, 4,155, 2,077, 6,232, 4,379, 2,222, 6,601
- Gross unearned premium provisions: 4,060, 1,878, 5,938, 4,349, 2,070, 6,419, 5,239, 2,493, 7,733

Other liabilities
- Sundry creditors: 2,000, 2,000, 2,000
- Amounts owing on borrowings: 2,000, 2,000, 2,000

Capital
- Paid-up capital: 2,000, 2,000, 2,000
- Retained earnings: 3,592, 3,579, 2,492

Total liabilities: 19,791, 20,231, 21,026
**Figure 8: Claims Runoff Estimates at the end of 2001, 2002, and 2003 for Class A, by Development and Accident Year (cumulative, net of reinsurance)**

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<td>4,380</td>
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<tr>
<td>2000</td>
<td>3,692</td>
<td>4,282</td>
<td>4,651</td>
<td>4,797</td>
<td>4,868</td>
<td>4,868</td>
</tr>
<tr>
<td>2001</td>
<td>3,510</td>
<td>4,107</td>
<td>4,461</td>
<td>4,600</td>
<td>4,668</td>
<td>4,668</td>
</tr>
</tbody>
</table>

| Estimate year 2002              |     |     |     |     |     |     |
| Accident year                   |     |     |     |     |     |     |
| 1996                            | 2,573 | 2,862 | 3,055 | 3,152 | 3,216 | 3,216 |
| 1997                            | 2,719 | 3,302 | 3,652 | 3,807 | 3,846 | 3,885 |
| 1998                            | 3,225 | 3,827 | 4,171 | 4,257 | 4,300 | 4,323 |
| 1999                            | 3,304 | 3,877 | 4,185 | 4,362 | 4,418 | 4,443 |
| 2000                            | 3,692 | 4,282 | 4,430 | 4,581 | 4,641 | 4,667 |
| 2001                            | 3,510 | 4,025 | 4,323 | 4,470 | 4,528 | 4,553 |
| 2002                            | 3,608 | 4,205 | 4,516 | 4,671 | 4,731 | 4,757 |

| Estimate year 2003              |     |     |     |     |     |     |
| Accident year                   |     |     |     |     |     |     |
| 1996                            | 2,573 | 2,862 | 3,055 | 3,152 | 3,216 | 3,216 |
| 1997                            | 2,719 | 3,302 | 3,652 | 3,807 | 3,846 | 3,885 |
| 1998                            | 3,225 | 3,827 | 4,171 | 4,257 | 4,300 | 4,300 |
| 1999                            | 3,304 | 3,877 | 4,185 | 4,362 | 4,406 | 4,421 |
| 2000                            | 3,692 | 4,282 | 4,430 | 4,529 | 4,584 | 4,600 |
| 2001                            | 3,510 | 4,025 | 4,165 | 4,296 | 4,349 | 4,363 |
| 2002                            | 3,608 | 4,127 | 4,403 | 4,541 | 4,597 | 4,613 |
| 2003                            | 4,482 | 5,209 | 5,557 | 5,732 | 5,802 | 5,822 |

*Note:* Estimates are as of the end of the estimate year. Figures in italics are estimates generated in the Supervisory Authority.
Figure 9: Claims Runoff Estimates at the end of 2001, 2002, and 2003 for Class B, by Development and Accident Year (cumulative, net of reinsurance)

<table>
<thead>
<tr>
<th>Estimate year and accident year</th>
<th>Development year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Estimate year 2001</strong></td>
<td></td>
</tr>
<tr>
<td>Accident year</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>1,286</td>
</tr>
<tr>
<td>1997</td>
<td>1,360</td>
</tr>
<tr>
<td>1998</td>
<td>1,612</td>
</tr>
<tr>
<td>1999</td>
<td>1,652</td>
</tr>
<tr>
<td>2000</td>
<td>1,846</td>
</tr>
<tr>
<td>2001</td>
<td>1,755</td>
</tr>
<tr>
<td><strong>Estimate year 2002</strong></td>
<td></td>
</tr>
<tr>
<td>Accident year</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>1,286</td>
</tr>
<tr>
<td>1997</td>
<td>1,360</td>
</tr>
<tr>
<td>1998</td>
<td>1,612</td>
</tr>
<tr>
<td>1999</td>
<td>1,652</td>
</tr>
<tr>
<td>2000</td>
<td>1,846</td>
</tr>
<tr>
<td>2001</td>
<td>1,755</td>
</tr>
<tr>
<td>2002</td>
<td>1,804</td>
</tr>
<tr>
<td><strong>Estimate year 2003</strong></td>
<td></td>
</tr>
<tr>
<td>Accident year</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>1,286</td>
</tr>
<tr>
<td>1997</td>
<td>1,360</td>
</tr>
<tr>
<td>1998</td>
<td>1,612</td>
</tr>
<tr>
<td>1999</td>
<td>1,652</td>
</tr>
<tr>
<td>2000</td>
<td>1,846</td>
</tr>
<tr>
<td>2001</td>
<td>1,755</td>
</tr>
<tr>
<td>2002</td>
<td>1,804</td>
</tr>
<tr>
<td>2003</td>
<td>2,282</td>
</tr>
</tbody>
</table>

*Note:* Estimates are as of the end of the estimate year. Figures in italics are estimates generated in the Supervisory Authority.
### Appendix VIII. Answer Key

#### Answers to the Pre-test

<table>
<thead>
<tr>
<th>Question</th>
<th>Most correct answer</th>
<th>Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(d)</td>
<td>Both the claims ratio and the combined ratio address the question of profitability. The herfindahl index is focused on market concentration overall and does not examine company profitability to any direct extent (module 11 covers the assessment of this index), and cession rates relate entirely to reinsurance use and may or may not impact profitability depending on the terms of the reinsurance placed.</td>
</tr>
<tr>
<td>2</td>
<td>(b)</td>
<td>Fronting will directly increase the cession ratio and use of reinsurance, low capital levels are also a common reason companies will use more reinsurance rather than raise more capital to cover the retention of the risk. Natural catastrophes, when present, can rarely be covered in full on their own account by even the best capitalized companies so their presence suggests a need for increased use of reinsurance compared to their absence. Technical expertise, it is argued, can be accessed with a reasonable level of reinsurance but it is doubtful that increased use of reinsurance above these levels would lead to access to additional expertise as it is generally provided to all reinsurance company customers.</td>
</tr>
<tr>
<td>3</td>
<td>(c)</td>
<td>Only the solvency coverage ratio requires the solvency margin to exist in the formula.</td>
</tr>
<tr>
<td>4</td>
<td>(d)</td>
<td>This question tests your understanding of the determination of unexpired premium provisions. If you wish to review this issue in more detail then Appendix II has been provided for closer explanation of the concepts involved.</td>
</tr>
<tr>
<td>5</td>
<td>(b)</td>
<td>If you do not have a clear understanding of accounting items such as IBNR then you may wish to study module 12 (a) before covering this module.</td>
</tr>
<tr>
<td>6</td>
<td>(f)</td>
<td>Refer to the paper, section B, for a discussion on business growth and supervisory concerns. Reinsurance may be but is not necessarily an answer for growth that does not raise it’s own questions for the supervisor.</td>
</tr>
<tr>
<td>7</td>
<td>(d)</td>
<td>For those who wish to better understand the definitions of terms used in accounting for insurance, then you may wish to study module 12 (a) before covering this module.</td>
</tr>
<tr>
<td>8</td>
<td>(c)</td>
<td>Stress tests are covered in the paper in section H.</td>
</tr>
<tr>
<td>9</td>
<td>(c)</td>
<td>Understanding the definition and characteristics of various classes of business is referred to in the paper. In the event that your understanding is limited, then you may wish to give particular attention to studying this aspect through exercise number 1.</td>
</tr>
<tr>
<td>Question</td>
<td>Most correct answer</td>
<td>Guidance</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------</td>
<td>----------</td>
</tr>
<tr>
<td>10</td>
<td>(g)</td>
<td>Understanding the definition and characteristics of various classes of business is referred to in the paper. In the event that your understanding is limited, then you may wish to give particular attention to studying this aspect through exercise number 1.</td>
</tr>
<tr>
<td>11</td>
<td>(b)</td>
<td>If you do not have a clear understanding of accounting items such as claims reserves then you may wish to study module 12 (a) before covering this module. If it is a particular area of interest to you, then the module on ICP20: Liabilities should be identified as a useful module you may wish to study soon after or with this module.</td>
</tr>
<tr>
<td>12</td>
<td>(i)</td>
<td>The first priority for the supervisor is to assess the risk and solvency situation for policyholders. In the event that the company is insolvent, but has filed forms correctly, then any action in the absence of identifying this fact would seem to be open to criticism.</td>
</tr>
<tr>
<td>13</td>
<td>(e)</td>
<td>Although it is a more obscure class of insurance, understanding the definition and characteristics of various classes of business is referred to in the paper. In the event that your understanding is limited, then you may wish to give particular attention to studying this aspect through exercise number 1.</td>
</tr>
</tbody>
</table>
Answers to the Exercises

<table>
<thead>
<tr>
<th>Exercise number</th>
<th>Part</th>
<th>Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(a)</td>
<td>Examine the regulations in place for the list of classes and the definitions of the types of insurance in each class. A list of classes will also appear on the financial returns. See also Appendix III for some international examples of the same thing. The IAIS glossary may help with definitions of the types of insurance usually categorized in different classes.</td>
</tr>
<tr>
<td></td>
<td>(b)</td>
<td>After preparing your answer, discuss it with an experienced colleague. In particular, look to understand whether there are any aspects of the classes of insurance that may cause their claims experience to be reported more quickly or more slowly than international norms.</td>
</tr>
<tr>
<td></td>
<td>(c)</td>
<td></td>
</tr>
</tbody>
</table>

2 (a) Premium Growth Rates:
Based on Gross Written Premium:
New Business:
Class A:
2001 to 2002 = 25.4% 2002 to 2003 = 31.1% 2001 to 2003 = 28.2% pa
Class B:
2001 to 2002 = 34.3% 2002 to 2003 = 24.7% 2001 to 2003 = 29.4% pa
Overall:
2001 to 2002 = 28.3% 2002 to 2003 = 28.9% 2001 to 2003 = 28.6% pa
Total Business:
Class A:
2001 to 2002 = 3.0% 2002 to 2003 = 13.7% 2001 to 2003 = 8.2% pa
Class B:
2001 to 2002 = 5.0% 2002 to 2003 = 13.6% 2001 to 2003 = 9.2% pa
Overall:
2001 to 2002 = 3.7% 2002 to 2003 = 13.6% 2001 to 2003 = 8.5% pa
Based on net written premium
Total business:
Class A:
2001 to 2002 = 0.5% 2002 to 2003 = 10.2% 2001 to 2003 = 5.3% pa
Class B:
2001 to 2002 = 6.4% 2002 to 2003 = 4.8% 2001 to 2003 = 5.6% pa
Overall:
2001 to 2002 = 2.3% 2002 to 2003 = 8.5% 2001 to 2003 = 5.3% pa
Based on gross earned premium
Total business:
Class A:
2001 to 2002 = 1.9% 2002 to 2003 = 8.0% 2001 to 2003 = 4.9% pa
Class B:
2001 to 2002 = 2.8% 2002 to 2003 = 9.6% 2001 to 2003 = 6.2% pa
Overall:
2001 to 2002 = 2.2% 2002 to 2003 = 8.6% 2001 to 2003 = 5.3% pa
Based on net earned premium
Total business:
Class A:
2001 to 2002 = 3.6% 2002 to 2003 = 5.0% 2001 to 2003 = 4.3% pa
Class B:
2001 to 2002 = 7.5% 2002 to 2003 = 4.7% 2001 to 2003 = 6.1% pa
Overall:
2001 to 2002 = 4.8% 2002 to 2003 = 4.9% 2001 to 2003 = 4.9% pa
Renewal Rates
Gross of Reinsurance:
Class A: 2002 = 75% 2003 = 78%, Class B: 2002 = 75% 2003 = 78%
Overall: 2002 = 75% 2003 = 78%
‘Per risk’ premiums
Gross basis (Note, information is available to calculate new business, renewal business and overall rates however, the company does not vary prices between renewals and new business so the answers are the same in all cases)
### Exercise number Part Guidance

<table>
<thead>
<tr>
<th>Class: 2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: $490</td>
<td>$501</td>
<td>$495</td>
</tr>
<tr>
<td>B: $275</td>
<td>$268</td>
<td>$260</td>
</tr>
<tr>
<td>Overall:</td>
<td>$389</td>
<td>$384</td>
</tr>
</tbody>
</table>

Net basis (Information for overall business available only)

<table>
<thead>
<tr>
<th>Class: 2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: $398</td>
<td>$397</td>
<td>$381</td>
</tr>
<tr>
<td>B: $198</td>
<td>$195</td>
<td>$175</td>
</tr>
<tr>
<td>Overall:</td>
<td>$304</td>
<td>$299</td>
</tr>
</tbody>
</table>

From the analysis, it is apparent that the company has increased total business more rapidly in the latest year. New business growth has been steadier over the two years but there appears to be a better result in Class A compensating for less success in Class B. Renewals have increased. However, this growth appears to have been achieved by a reduction in premium rates. The company policy in this respect should be investigated to try to understand whether the trends are deliberate and pro-active or reactive. The expectations on pricing for the future would also seem to need to be understood. The company should be asked whether it intends to continue growth, in line with the apparent policy of the latest year, or return to the steadier progress seen in the previous year. Given the pricing change, the question arises about whether the increased renewal rate was only achieved because of discounting and, in the absence of the price reductions; the company would otherwise have found it difficult to maintain renewal levels.

Discuss your answer with an experienced supervisor in your jurisdiction.

<table>
<thead>
<tr>
<th>Cession rates (before allowing for reinsurance commissions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class A: 2001 25.0% 2002 28.0% 2003 33.0%</td>
</tr>
<tr>
<td>Class B: 2001 35.0% 2002 33.0% 2003 39.0%</td>
</tr>
<tr>
<td>Overall: 2001 28.3% 2002 29.7% 2003 35.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Net retention rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class A: 2001 75.0% 2002 72.0% 2003 67.0%</td>
</tr>
<tr>
<td>Class B: 2001 65.0% 2002 67.0% 2003 61.0%</td>
</tr>
<tr>
<td>Overall: 2001 71.7% 2002 70.3% 2003 65.0%</td>
</tr>
</tbody>
</table>

Maximum event retentions (MER): As the MER has not changed and is the same for all classes then the overall ratios to capital are most relevant. For these calculations, capital is taken to be paid up capital plus retained earnings less the borrowing. The ratio values are 2001 = 11% 2002 = 11% 2003 = 15%

Reinsurance recoveries as a percentage of total assets
2001 = 14.8%, 2002 = 15.2%, 2003 = 17.4%

Reinsurance recoveries as a percentage of available capital
2001 = 81.6%, 2002 = 86.2%, 2003 = 135.8%

All information is available to calculate the suggested ratios.
<table>
<thead>
<tr>
<th>Exercise number</th>
<th>Part</th>
<th>Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td>The use of reinsurance appears to have increased progressively through the period. This suggests that the growth in business identified earlier has also led to an increase in the use of reinsurance to manage this exposure but it may also suggest that the use of reinsurance, selective as it is between classes and more in class B, may reflect management views as to the level of risk relative to the premiums being achieved (as they were reduced materially as noted above). At the same time, the reinsurance commissions paid have changed (Class A: 2001 25%, 2002 26% and 2003 30%, Class B: 2001 20%, 2002 18% and 2003 16%) suggesting that the reinsurers are becoming less enthusiastic about class B and more enthusiastic about class A. Despite this reduction in the commission, the company is reinsuring more under class B than ever suggesting that they share the concern about the prospects for this class. Overall, the ratios suggest that the company is changing it’s reinsurance practices and policies at a tactical level and this needs to be better understood – as an analyst, in the absence of contradicto-ry information, these changes taken with the business mix changes suggest that the company is reacting to events both on the inward and outward side of its insurance risk taking and trying to “make the best of it” rather than being the maker of its own destiny. Before, on business volume analysis, we had inquisitive questions – now we have questions that we have to have answers to and understand to feel comfortable with the company direction. Additionally, reinsurance recoveries have increased as a proportion of the balance sheet and of available capital. In the most recent year, now over 100% of capital, then the failure of this asset would render the company insolvent. The number and quality of reinsurance counterparties making up the reinsurance recoveries reported is, therefore, now worthy of particularly close investigation and the answer to this investigation is something that the supervisor must be satisfied. It is somewhat notable that the reduced capital position in 2003 has not led to a reduction in the retention per event. This raises the question as to how closely the company manages their individual retention policy. To an extent, this is a subsidiary question to the larger one raised above.</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Discuss your answer with an experienced supervisor in your jurisdiction.</td>
</tr>
</tbody>
</table>
Exercise number | Part | Guidance
---|---|---
8 | (a) | Claims Ratios

**Gross of Reinsurance**
- **Class A:** 2001 = 60.7%, 2002 = 61.2%, 2003 = 64.6%
- **Class B:** 2001 = 60.7%, 2002 = 60.6%, 2003 = 64.5%
- **Overall:** 2001 = 60.7%, 2002 = 61.0%, 2003 = 64.6%

**Net of Reinsurance**
- **Class A:** 2001 = 55.2%, 2002 = 56.4%, 2003 = 63.2%
- **Class B:** 2001 = 62.6%, 2002 = 61.6%, 2003 = 70.8%
- **Overall:** 2001 = 57.5%, 2002 = 58.1%, 2003 = 65.6%

**Expense Ratios (to written premium)**

**Gross of Reinsurance**
- **Class A:** 2001 = 26.5%, 2002 = 26.9%, 2003 = 27.2%
- **Class B:** 2001 = 25.0%, 2002 = 28.3%, 2003 = 30.9%
- **Overall:** 2001 = 26.0%, 2002 = 27.4%, 2003 = 28.4%

**Net of Reinsurance**
- **Class A:** 2001 = 24.9%, 2002 = 24.8%, 2003 = 22.5%
- **Class B:** 2001 = 25.0%, 2002 = 30.7%, 2003 = 36.6%
- **Overall:** 2001 = 24.9%, 2002 = 26.7%, 2003 = 26.8%

Note that the commission rates can also be calculated:

On gross written premium:
- **Class A:** 2001 = 20.0%, 2002 = 20.0%, 2003 = 20.0%
- **Class B:** 2001 = 15.0%, 2002 = 17.5%, 2003 = 20.0%
- **Overall:** 2001 = 18.3%, 2002 = 19.2%, 2003 = 20.0%

**Reinsurance commission rate received:**
- **Class A:** 2001 = 25.0%, 2002 = 26.0%, 2003 = 30.0%
- **Class B:** 2001 = 20.0%, 2002 = 18.0%, 2003 = 16.0%
- **Overall:** 2001 = 22.9%, 2002 = 23.0%, 2003 = 24.7%

**Combined ratios**

**Gross of Reinsurance**
- **Class A:** 2001 = 87.2%, 2002 = 88.1%, 2003 = 91.8%
- **Class B:** 2001 = 85.7%, 2002 = 88.9%, 2003 = 95.4%
- **Overall:** 2001 = 86.7%, 2002 = 88.4%, 2003 = 93.0%

**Net of Reinsurance**
- **Class A:** 2001 = 80.1%, 2002 = 81.2%, 2003 = 85.7%
- **Class B:** 2001 = 87.6%, 2002 = 92.3%, 2003 = 107.4%
- **Overall:** 2001 = 82.4%, 2002 = 84.8%, 2003 = 92.4%

**Investment Income ratios** (including the increase or decrease in the value of investments and compared to net earned premium in this case although another numerator and denominator can be considered)
- **Overall:** 2001 = 8.8%, 2002 = 8.6%, 2003 = 8.0%

**Profit ratios**

Net underwriting result to net earned premium – the underwriting ratio
- **Class A:** 2001 = 10.5%, 2002 = 9.0%, 2003 = -0.1%
- **Class B:** 2001 = 0.8%, 2002 = -2.1%, 2003 = -18.7%
- **Overall:** 2001 = 7.6%, 2002 = 5.5%, 2003 = -6.5%

Profit to premium can also be calculated compared to gross or net premium and written or earned premium. The result, using profit after interest and tax compared to net earned premium is:
- **Overall:** 2001 = 11.9%, 2002 = 10.1%, 2003 = 0.1%
<table>
<thead>
<tr>
<th>Exercise number</th>
<th>Part</th>
<th>Guidance</th>
</tr>
</thead>
</table>
|                 |      | Quality of investment result  
The investment earnings are made up of both income items and changes in market value. The earnings component could be considered of greater quality. This earning component makes up the following proportion of the (falling) total investment earnings result:  
Overall: $2001 = 75.5\%$, $2002 = 75.1\%$, $2003 = 75.1\%$  
The Investment income expressed as a proportion of average assets (using equation 16) is as follows:  
Overall: $2002 = 3.8\%$, $2003 = 3.6\%$ |
<p>| (b)             |      | Ratios relating to book values and market values are not able to be calculated as book and market values are not shown separately. The investment income ratio for 2001 is not able to be calculated as assets at the start of 2001 are not presented. |
| 9               |      | Despite the change in premium rates and the growth in new business, the claims ratio has not moved as much on a gross basis as it has on a net basis suggesting that underwriting standards are, as far as this measure tells to this point, remaining somewhat consistent although the more recent year is a cause for continuing monitoring. Claims management and claims experience have also deteriorated and the reinsurers have sought to extract a greater proportion of the more profitable business from the company. They have reduced the commission rates on the less profitable class despite the company’s increased cessions in this class. The combined ratio for class B suggests that this is now unprofitable for the company, and profit ratios now indicate that continuing profitability in the absence of a change of course is in jeopardy. That suggests, subject to a need for closer examination, that the increased use of reinsurance may have been to the company’s detriment and in response to a need to protect the gross results and delay a necessary capital raising. The company needs to explain what course of action it is proposing to avert the loss of profitability. |
| 10              |      | Discuss your answer with an experienced supervisor in your jurisdiction. |</p>
<table>
<thead>
<tr>
<th>Exercise number</th>
<th>Part</th>
<th>Guidance</th>
</tr>
</thead>
</table>
| 11              | (a)  | Unearned premium provision to written premium:  
In the example, the results are the same on either a gross or net (of reinsurance) basis  
Class A: 2001 = 40.6%, 2002 = 42.2%, 2003 = 44.8%  
Class B: 2001 = 37.6%, 2002 = 39.4%, 2003 = 41.8%  
Overall: 2001 = 39.6%, 2002 = 41.3%, 2003 = 43.8%  
Claims Paid to Claims Provisions (using, in this case, claims paid compared to provisions including or not including IBNR at the end of year). In the case of this example, although individual calculations can be done for separate classes of business, the figures are the same in each case.  
On a gross of reinsurance basis not including IBNR  
Overall: 2001 = 422%, 2002 = 432%, 2003 = 430%  
On a gross of reinsurance basis including IBNR  
Overall: 2001 = 149%, 2002 = 148%, 2003 = 154%  
On a net of reinsurance basis not including IBNR  
Overall: 2001 = 428%, 2002 = 430%, 2003 = 428%  
On a net of reinsurance basis including IBNR  
Overall: 2001 = 150%, 2002 = 147%, 2003 = 154%  
IBNR to reported provisions (IBNR to total provisions) (gross and net)  
On gross of reinsurance figures  
Class A: 2001 = 64.6%, 2002 = 65.7%, 2003 = 64.1%  
Class B: 2001 = 64.7%, 2002 = 65.7%, 2003 = 64.0%  
Overall: 2001 = 64.7%, 2002 = 65.7%, 2003 = 64.1%  
On net of reinsurance figures  
Class A: 2001 = 65.0%, 2002 = 65.8%, 2003 = 64.0%  
Class B: 2001 = 65.0%, 2002 = 65.8%, 2003 = 63.9%  
Overall: 2001 = 65.0%, 2002 = 65.8%, 2003 = 63.9%  
Actual to expected claims net of reinsurance and for each accident year or for groups of accident years together using the actual and expected claims from the supervisory authority expert tables. Here, only grouped results are shown:  
Class A: 2002 (for accident years 1997-2001) = 79.5%  
Class A: 2003 (for accident years 1998-2002) = 71.3%  
Class B: 2002 (for accident years 1997-2001) = 79.3%  
Class B: 2003 (for accident years 1998-2002) = 72.0%  
Comparing the claims provisions to the supervisory estimates indicates that the IBNR for Class A and Class B match the supervisory estimates in the run-off tables. |
| 11              | (b)  | No information is provided in with respect to the Unexpired Risk Provision, if one exists. It is also not possible to calculate the ratio set out in equation 21 as the actual claims provision adopted by the company is not provided broken down by accident year and the estimates generated by the supervisory authority do not match those adopted by the company. |
| 12              |     | The UPP method used by the company should be understood and, given these figures, there is some evidence that it may have been adjusted. But there are alternative explanations; either the effect of the changing volumes of business or the incorporation of an unexpired risk element but not reporting it separately could be reasons. That said, the level of the UPP in the first year at less than 40% for class B.  
Additionally, unless it is not disclosed and is contained in the UPP, there appears to be no Unexpired Risk provision. The need for this provision has become more obvious given the recent loss making performance of the business.  
IBNR figures are consistent with internal estimates and, compared to the part of the provision relating to reported claims, both show a consistent trend and suggest fairly stable actual provisioning practices. |
<p>| 13              |     | Discuss your answer with an experienced supervisor in your jurisdiction. |</p>
<table>
<thead>
<tr>
<th>Exercise number</th>
<th>Part</th>
<th>Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td></td>
<td>The reported asset mix is as follows:</td>
</tr>
<tr>
<td></td>
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<td>Premiums due not received: 2001 = 12.6%, 2002 = 14.9%, 2003 = 18.6%</td>
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<td>Government bonds: 2001 = 35.7%, 2002 = 34.9%, 2003 = 33.3%</td>
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<td>Other fixed interest: 2001 = 15.3%, 2002 = 14.2%, 2003 = 12.0%</td>
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<td>Equity: 2001 = 7.9%, 2002 = 7.5%, 2003 = 6.5%</td>
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<td>Real Estate: 2001 = 2.6%, 2002 = 2.6%, 2003 = 2.6%</td>
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<td>Cash: 2001 = 2.5%, 2002 = 2.5%, 2003 = 2.4%</td>
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<td>Fixtures etc.: 2001 = 1.4%, 2002 = 1.4%, 2003 = 1.3%</td>
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<td>Foreign fixed interest: 2001 = 4.0%, 2002 = 4.0%, 2003 = 3.8%</td>
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<td>Foreign equity: 2001 = 1.5%, 2002 = 1.2%, 2003 = 0.7%</td>
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<td>Foreign cash: 2001 = 1.5%, 2002 = 1.5%, 2003 = 1.4%</td>
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<td>Reinsurance recoveries: 2001 = 14.8%, 2002 = 15.2%, 2003 = 17.4%</td>
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<td>Comments: Investment assets have remained relatively stable in asset mix over the period, but a falling proportion of the total as reinsurance and premium items have grown more significantly with the business and increased the size of the overall balance sheet.</td>
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<td>15</td>
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<td>The exposure to non-investment assets in the model accounts is as determined above for fixtures, premium receipts and reinsurance recoveries. As a result of this issue in isolation, it would be considered that the company has become more or less secure depending largely on the nature of the reinsurance counterparty exposure. If the counterparties to the reinsurance asset remain diverse and of good credit standing the assessment will be different to if the growth has been represented to a limited number (or one) counterpart reinsurer. This could be a source of inquiry.</td>
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<td>16</td>
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<td>Discuss your answer with an experienced supervisor in your jurisdiction.</td>
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<td>17</td>
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<td>Discuss your answer with an experienced supervisor in your jurisdiction.</td>
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<tr>
<td>18</td>
<td>(a)</td>
<td>Gross written premium to capital</td>
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<td>Overall: 2001 = 2.68, 2002 = 2.79, 2003 = 3.77</td>
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<td>Net written premium to capital</td>
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<td>Overall: 2001 = 2.10, 2002 = 2.15, 2003 = 2.77</td>
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<td>Capital to technical provisions</td>
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<td></td>
<td>Overall: 2001 = 45.8%, 2002 = 44.0%, 2003 = 32.7%</td>
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<td>(b)</td>
<td>No advice is provided as to the solvency margin so it is not possible to determine the ratios that require this variable.</td>
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</table>
21 First, we need to make assumptions about the loan issues. The following calculations assume that they are resolved and that the capital levels as stated (4,692 in total) are able to be accepted without adjustment. The alternative assumption, that the capital for the purpose of this calculation should be reduced to 2,692 would be acceptable also and, if advising your superiors, the sensible course would be to advise on both scenarios if the loan situation has not been clarified. Also, in each case, the assumption of correlated effects needs attention. The first step, and that assumed below, is that there are none. A more complex response would make explicit assumptions (for example, that a fall in equities would also see a fall in other assets by some amount) that the student would have to postulate. Given the limited information, to reach a conclusion in the calculations it may be necessary to make assumptions in the absence of information. The ‘zero change elsewhere’ assumption is just one. For example, an alternative could be ‘when foreign exchange rates deteriorate, local equity values fall by 20% of the level of the exchange rate movement and interest rates rise such that fixed interest portfolios also fall in value by 15%’.

20 Discuss your answer with an experienced supervisor in your jurisdiction.

19 Capital levels in the company fell with the effect of the dividend payment being maintained in 2003 despite the poor business result, in effect a repatriation of capital decision made by the company board. The rationale for this decision should be investigated. Considering the technical provision based ratio above, should the same situation be repeated in the next year (capital reduces by near to 900,000 and business continues to at current levels – albeit that it can be expected to grow some more just through the momentum) then ratios would deteriorate. Additionally, although not appearing to be an issue in earlier years due to the higher capital levels, the loan for $2 million should be better understood. If it is a long term loan with a long duration still to go then it is less of a concern than if it is a commitment that could be called up and need to be repaid in the near term (such a repayment could be considered as reducing capital / retained earnings by the same amount). Any difficulty in refinancing the loan would now lead to capital levels being less satisfactory and, given the recent performance of the business, the question of refinancing capacity would have to be addressed. Management should have addressed it if they are carrying out their responsibilities diligently so an inquiry seeking their position and any actions they have put in place to mitigate the risk would be useful once the terms of the loan are better understood. Given the potential outcome (capital reduced to 2.7 million and the ratio of capital to NPW falling to 21% or a gearing ratio of NPW of 4.83 times capital) then the supervisory authority needs to reach a level of comfort with the situation. If management have not addressed the issue and cannot readily advise of a plan, this would also raise concerns about their diligent oversight of the company. If the two concerns are taken together, that the company had the loan called up and they also paid another dividend of the same order, then the situation would be particularly unsatisfactory and would require very significant supervisory intervention. Given that this scenario can be predicted now, on current figures, the authority should get involved in an active pursuit of a solution now.
<table>
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<th>Exercise number</th>
<th>Part</th>
<th>Guidance</th>
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<tbody>
<tr>
<td>21</td>
<td>(a)</td>
<td>The question does not state whether or not the fall in the index relates to local or all equity investments. An assumption is required there and should be stated. The following assumes that the fall applies to the local index only. As equities are 1,362 and capital is 4,692 then a fall in the value of the equities all the way to zero would be able to be absorbed by the company without risking insolvency. Capital would reduce to 3,330 in such a scenario. The only real potential for the company to do more than write off the full value of these investments would be if they had certain derivative contracts that could cause the value of the equity portfolio to fall beyond the point of ‘zero’ into negative territory. As a result, it would be complete to note that an additional assumption is that any derivative instruments do not magnify the size of the fall in markets on the portfolio in this way.</td>
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<td>(b)</td>
<td>Again, first we assume that the implied market is the local market rather than effecting the international market (alternative assumptions are acceptable but it is important to be aware of the assumptions made and to state them) and that the international markets will not move at the same time – that is, the cause of the change is a wholly local issue. Second, we need to make an assumption about whether or not the change effects government bonds, other fixed interest, or both. Let’s assume that it is both and to the same extent. Third, the movement in interest rates effects bond prices differently depending on their duration (refer to the module on Investments for a more detailed elaboration of this matter) so we would need to assume that both the government and other fixed interest portfolios have much the same duration (or assume a specific duration for each). Cash and short term deposits could be included but it may be easier to assume that they are not being effected and the question is addressed to longer term interest rates. In aggregate, the government and other fixed interest totals 9,528. Compared to capital, this means that the capital is just under 50% of the fixed interest value so, in the absence of any other effects from derivatives etc, the portfolio would be able to fall by 50% in value before all capital was exhausted. Of course, this does oversimplify the situation because, as rates rise, companies (generally in the economy) would come under more financial distress and there could be expected to be some bankruptcy effects – ie some of the fixed interest exposure may reduce in value by 100%. But it does provide an index that can be compared to companies across the sector and then permits the supervisor to identify those companies ‘more exposed’ and worthy of closer attention on the issue of the management of exposure to this risk.</td>
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<td>(c)</td>
<td>Total foreign assets represent 1,233 if we assume that none of the reinsurance contracts are denominated in other than local currency. This represents 26% of total capital before reducing for the loan and, therefore, suggests that the full amount could be written off if a devaluation was the only issue to address.</td>
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<td>(d)</td>
<td>Class B provisions total 4,715 or just over 100% of capital. As a result, an increase in the provisions of, for example, 20% (943) would reduce capital by the same amount (to 3,749) and leave the ratio of capital to the total technical provisions for the company overall at 3,749 / 15,277 = 24.5% compared to the current 32.7%. The company would become insolvent if the provisions were, in the absence of any other events and at a single stroke, doubled.</td>
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