

<b>PREMIUM RATING INDICES</b>
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**GIRO 2001 Workshops**

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## **PREMIUM RATING INDICES**

### **Authors**

Philip Archer-Lock  
Nigel Finlay  
Alex Foord  
Ian Hilder  
Mike Keig  
Stephen Mathews  
Bill McConnell (Chairman)  
James Tanser  
Stephen Wilcox  
Martin White

### **Overview**

This paper is written for a workshop discussion at GIRO 2001. Its main purpose is to promote discussion on premium and related indices, their uses, and how to construct them. The working party hope that the workshop discussions will focus on commercial uses for the ideas in the paper, and on identifying and solving the practical and political problems raised by each use. The discussions will also incorporate the findings from a premium rating index that is used in practice.

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## **1 Introduction**

### **1.1 Purpose**

This paper is written for a workshop discussion at GIRO 2001. Its main purpose is to promote discussion on premium and related indices, their uses, and how to construct them. The working party hope that the workshop discussions will focus on commercial uses for the ideas in the paper, and on identifying and solving the practical and political problems raised by each use.

### **1.2 Background to the working party**

The FSA have told us that they would very much welcome greater availability of rating indices, partly for their own purposes but more importantly to inform the market. The additional information would allow insurers and underwriters to make better informed decisions, including whether to enter or leave particular markets and better understand the costs of so doing. As well as improving rating and other underwriting decisions, indices would be of use for reserving.

Lloyd's has received criticism in recent years for its inability to predict the broad level of profitability of open years of account. The approach used to put these predictions together was to aggregate the predictions of the individual syndicates. In the recent soft markets, this approach has materially understated losses. We would expect profits also to be understated in a strong market. There may be a tendency for syndicates' predictions to be too heavily biased towards the loss ratios the underwriters thought or hoped they were writing in the years concerned.

In the Lloyd's context, it had been suggested that some sort of measure of premium strength for different lines of business was needed, either to adjust estimates made by syndicates, or to be used by syndicates when making their predictions. The same suggestions could equally apply to companies. The working party was set up on the subject of "premium indices" and it quickly became clear that there were many different aspects of and uses for premium and related indices.

### **1.3 More than one type of index**

The managers of insurance companies are continuously asking themselves questions.

*How strong are premium rates in the market today?*

*How do we compare to our competitors?*

*What is the minimum premium rate needed to write this risk given today's expected loss costs and terms and conditions for this business?*

*What was the expected profitability when this business was written? We don't have enough claims experience yet.*

*What is the expected profitability for the business we wrote two years ago, given what we now know about the loss experience?*

*Market rates are low, but we don't know quite how bad it is. What should we do about it? (This question could be asked by an insurer's board from one perspective and by a regulator from another)*

*How do we plan our business given the vagaries of the cycle, and where are we in the cycle anyway?*

Indices of all sorts have been suggested as useful in each of the circumstances above.

#### **1.4 Radical ideas and practical solutions – what we would like to get out of the workshops**

As mentioned above, this working party started because of the difficulty Lloyd's had in predicting aggregate results on open years of account. Many of the uses members of the working party had in mind were to do with reserving the open years. But some more radical ideas suggest themselves. An underwriter with many years of experience has suggested that the losses of the last few years could have been mitigated to a certain extent if there were regulatory controls in place limiting effective capacity in a class of business when premium levels are below some measure of break-even. He felt that in a soft market people needed to be "saved from themselves". This would help counteract the desire to maintain market share and to write for premium rather than profits.

Is this idea too radical? More likely the response will be "not practical". Another response is that the recent losses are so large and so self-inflicted that a radical idea is needed and the profession should do its share of trying to find practical solutions.

This suggests some objectives for the workshops, which we hope will generate further ideas to take this subject forward in the coming year. We will focus on identifying possible uses, and on solving the practical problems

- (a) Quick run through commercial and other potential uses, and brainstorm for more radical ideas

- (b) Quick run through one numerical example of a premium rate index, as used to help reserve recent underwriting years.
- (c) Presentation based on the work done to develop the Lloyd's market premium rating indices, including examples of the variations in estimates supplied by managing agents.
- (d) For all of the uses identified discussion of the practical and political problems and possible solutions to them.

At the workshop, we will also report on the results of the questionnaire (see Appendix A).

Following the workshops, the intention is to form a successor working party to carry out some detailed work. This may be an opportunity for collaboration outside the profession, for example, with regulators.

## **2 Uses of premium rate indices**

A premium rate index can be viewed as a thermometer of how the market is doing and as such can be used for a number of purposes. The following is a summary of these:

### **Reserving**

Premium rating indices will be of particular use when for the later years, the claims data is limited and relatively unreliable, and loss ratio methods such as the Bornhuetter Ferguson method are used. Typically in this case the rating index is used to adjust historical estimated ultimate loss ratios to derive a prior estimate for the ultimate loss ratio for the year being reviewed. That is, the rating index is used as part of the process to estimate a measure of expected claims that are applied to an exposure measure, such as premium volumes. Hence the ideal index would reflect expected claims experience relative to previous years.

### **Predicting cycle**

Premium rating indices showing market premium rate movements can be used to monitor the position in the insurance cycle. These can be projected to help estimate future movements.

### **Planning**

In order to draw up business plans and set target loss ratios for underwriting, it is necessary to estimate the expected loss ratios that are possible within the current and future market conditions. Market rating indices can be used to adjust the historical

experience to make it applicable to current market conditions, and the projection of the cycle mentioned above can be used to estimate the likely future experience.

### **Monitoring**

Internal rating indices can show if you are meeting premium rate increase targets.

Internal versus external rating movements show changes in relative position in the market. This might be used to as part of an assessment of price elasticity, or to assess the comparative effectiveness of underwriting.

### **Marketing**

A premium rating index might be published to relay a desired message to other parties in order to influence their actions.

### **Analysing returns**

Rating indices can be used as part of an analysis of change of company or market results. They will help identify what part of the change in result has been caused by rating movements. This may be used retrospectively to analyse known results, or prospectively to predict current and future returns.

A model using rating indices could also be used to test the sensitivity of returns to changes in premium rates.

### **Dynamic financial analysis**

Internal and external indices could be used as inputs into dynamic financial analysis models. Potentially, this can be very complex, including some measure of how the competitiveness of the company varies over time, which may in turn feed through to the assumed mix of business via lapse and new business models.

### **Reasonableness testing**

Even if alternative methods are used to carry out reserving or the other items mentioned above, simple models using rating indices may be a useful reasonableness test for the results of the other analyses.

## **3 Desirable features of rating indices**

The ideal form of the rating index may vary with the intended use and before an index is constructed it is necessary to ensure that the information to be collected for the index will be appropriate to enable all desired uses to be addressed.

Having said that, the most desirable feature of any premium rating index is that, combined with an appropriate claims index and a benchmark for a single period's profitability, it should allow the expected profitability of the market in subsequent or prior periods to be assessed.

One difficulty that presents itself when attempting to achieve the above is fragmentation within the market, that is, the presence of heterogeneity within classes of business. This is may not be so much of an issue for large personal lines whose portfolios mirror the whole market. For more specialised entities, such as those found in Lloyds, fragmentation and specialisation is much more prevalent.

Another area of difficulty encountered by users of premium indices is determining the influence of the exposure measure on the index.

For example:

- Primary Motor rating uses vehicle years as a measure of exposure. From one year to the next this is a stable measure of exposure and should not unduly impact the index
- When property catastrophe Excess of Loss reinsurance programmes are placed, the usual measure of exposure available is the underlying portfolio income. Any attempt to construct an index for this class of business will be constrained in that we will be comparing rates from one period to the next for layers whose attachment levels and limits are expressed as a proportion of the portfolio income. Any variation in the underlying insurance cycle will distort our index unless we are able to adjust explicitly for that cycle.

We have described above two issues that should be addressed or at least understood in the construction or application of a premium rating index. What follows is a more general list of desirable features for a rating index:

- Data is reliable and easy to collect on a regular basis
- Data is objective and not subject to individual interpretation
- The index should be consistent over time. Clearly in our second example, if we are not able to adjust for underlying rate movements, there is a danger that the index will not be consistent over time.
- Easy to calculate
- Able to deconstruct the index to identify causes of change. For example it is desirable that the historical index values can be easily recalculated to reflect



changes in current conditions.

- Any changes in the basis of construction of the index should be known
- The index should be published at intervals that are appropriate to the class of business.

Of course these desirable features are not always compatible. It should be recognised that there will often be a trade off between ease of calculation, objectivity and accuracy.

#### **4 Construction of indices**

The construction of a premium rating index will depend on the use it is to be put and the information that is available.

##### **Subjective**

This would involve interviewing underwriters, asking them for their views on how they think the prices are changing, taking into account changes in conditions, in underlying risks and monetary effects.

This kind of approach has the disadvantage of being very subjective, and is difficult to verify in detail analytically. However, certain cross checks can be performed on a sample basis which, although they may not provide conclusive evidence either supporting or contradicting the underwriters view, should provide test of the integrity of the underwriters arguments. Similarly discussions on why his views on movements differ from that of the market implied by other indices can usually make the interview more effective. In time it can also be beneficial to consider retrospectively how the experience compares to the estimated indices.

On the positive side, this type of index should be able to allow for more of the “soft” factors influencing profitability that a more formulaic approach may miss – for example changes to risk management procedures implemented by the insured.

Although it may be satisfactory for internal purposes it may be difficult to assess across companies. It may also be difficult to ensure consistency over time within one organisation, particularly if there is a change of personnel producing the index.

##### **Comparative**

Measure premium changes on individual contracts that have been renewed from one year into the next. This type of approach involves quantifying the key drivers of profitability on a contract, including in particular

- (a) Changes to terms & conditions
- (b) Changes in quantum of coverage – deductibles, limits (both per risk and aggregate)
- (c) Absolute level of premiums
- (d) Adjust for inflation/exposure

This approach has the advantage of being objective, in that movements in an index so derived will be attributable to factual evidence.

However, disadvantages include

- (a) The renewed business is only a subset of the portfolio and so care should be taken when applying the index to an account where there is a significant change in the business underwritten
- (b) This will not account for the “softer” factors that probably will feature in the underwriting decision, but the precise impact on profitability will be hard to quantify

**Dual-pricing – underwriters produce two sets of prices, one on last year's basis and the other on their current basis.**

This is time consuming and likely to be unpopular. It also only works where the underwriter is applying a technical approach to pricing the business.

In reality this would be likely to yield similar results to the comparative approach.

**Compilation of index of Actual versus Actuarial premium**

This involves calculating, for each risk, an actuarial best estimate price using past experience, current policy conditions, and any other relevant information – practically this would be anything provided to the underwriter as part of the underwriting process. This price could include standard, fixed profit and expense loadings. This is the theoretic cost of the risk for the next year. This can then be compared with the actual price charged for the risk - the ratio between these figures indicates the hardness/softness of the market.

Monitoring how this ratio changes over time will give you an index on price movements.

In theory this is probably the index with the most intuitive appeal, although actually doing it in practice could present a number of problems, such as

- (a) It would involve a lot of work, unless such premium calculations are part of the normal underwriting process, although it could probably be done after the fact by the actuarial department with relatively limited burden on underwriters
- (b) It works very well for classes of business that lend themselves to “actuarial” pricing methodologies, but not so well for other types of business

An enhancement – again requiring more time commitment – would be additionally to perform the exercise for business that was offered but declined. The aggregate results would probably give a better overall indication of a market index, and would also give an indication of the effectiveness of the selection being applied by the underwriter. There may be something of a self-fulfilling prophecy here though. Whether an index constructed in this manner is useful will depend upon the use to which it will ultimately be put.

### **Standard risk**

Periodically (every quarter or year?) ask underwriters to price a standard risk on the current basis.

This works reasonably well in the case of personal lines, where rating factors are objectively defined. In this case, for example for motor, this could be extended to doing it on a sample portfolio (based on own mix or target mix of business) and comparing the rates with competitors using a broker quotation system.

A particular example of this, which gives an indication of the current rate in the market rather than on the portfolio in question, is the use of market rate sampling using software such as “WhatIf”.

In the wholesale market, where price is often the result of negotiation between insurer and insured, any such index is likely to be too artificial to be of much use unless the underwriter can build the expected impact of such a negotiation process into the rate.

These market pressures do also affect the retail market, where discounts are used. The impact of the discount over time will vary, even if the discount itself is tightly controlled. The discount also makes broader market comparisons harder to make.

### **Subjective target**

This involves asking underwriters what loss ratio they think they will achieve on the business they write

This is essentially the same as the subjective method above

### **Unit rate**

If you can assume the average level of risk is constant and you have a reasonable measure of exposure (eg sum insured year) an index of the ratio of written premium:exposure can be constructed

This has the benefit of being very easy to do and is probably helpful as a first indicator. However, it is reliant on a number of important assumptions.

### **Polling of Views across the market**

This effectively means using the subjective method for a cross section of underwriters in the market.

This should in some way address the limitations of relying on the subjective opinion of one underwriter, although the impact of the herd instinct should not be ignored. There are also issues relating to consistency which would need to be considered. In practice these could be ameliorated to some degree through clear communication of the questions, but where reliance is being placed upon insurers management information, inevitably each looks at things in a slightly different way, and so inconsistencies will arise.

## **5 Claims inflation**

In a paper looking at the construction and use of premium rate indices, the reader may well wonder why there is a section on claims inflation. The answer to this question is, of course, that one of the main uses of premium rate indices is in the determination of a suitable loss ratio for use in claims reserving, and so the movement of claims cost relative the movement in premium rates is of considerable interest.

It is important that we can separate increases due to claims inflation from increases (or decreases) in profit loadings if we are to monitor and manage future profitability. One way to achieve this is to adjust the premium rate index so as to remove the effect of claims inflation. Alternatively, the relative rates of claim and premium changes could be used to adjust the initial expected loss ratio which may be used in the calculation of reserves.

Not all classes are affected by claims inflation in the same way. For some insurance products the risk measure used is not measured in financial terms (for example, the vehicle year measure for private motor cover). In this case it is clearly necessary to assess how much of any increase in premiums relates to increase in the expected level of claims cost. Many other products are based on a risk measure that is measured in monetary terms (such a payroll for employer's liability cover). For these products it is

necessary to ask if the risk measure is increasing in the same way as claim cost. It may very well be argued, for example, that the cost of EL claims will rise faster than payroll due to changes in both the number and average cost of claims.

For excess of loss reinsurance there is an additional complication, as in addition to the effect of claims inflation and sum insured inflation there is also the question of how the excess point and limit are indexed (if at all). The effect of different rates of inflation is geared, as a rate of indexation lower than the claims inflation will tend to lead to a steady increase in the number of claims impacting on the policy.

Historic information on claims inflation can be obtained from a number of sources. A company will have its own internal data which can be used to assess the rates of increase. In addition to this, it is possible to use data from industry bodies, if suitable data is available. Finally, other data sources can be explored, for example by looking at the rates of inflation which drive claims cost (for example, wage inflation and spare parts cost for motor repair costs).

Care should be taken that the inflation index prepared is on a suitable basis. The average cost of a settled claim in a year is clearly a calendar year measure, where the premium index may be on an underwriting year basis. Once a suitable schedule of past (calendar year) inflation has been prepared, it may then be necessary to project the rates forward, to include both the most recent periods where data is not yet available and future periods. It will then be possible to calculate an underwriting year basis using a suitable settlement pattern and discount rate. This calculation would have to be repeated at regular intervals as the claims run-off and the actual figures become known.

Claims inflation is an important consideration in the construction of a premium rate index for all types of general insurance business. Once calculated, the effect of claims inflation may be incorporated into the premium rate index or used separately to help adjust the assumed loss ratio for reserving calculations. In either case the calculation of a suitable measure of claims inflation can present its own difficulties caused by differences between underwriting and calendar year bases.

## **6 Categories of business where a premium rating index may not be appropriate**

- (a) In general, highly heterogeneous classes of business will be less suitable for constructing a rate index than homogeneous classes. The level of suitability will, as always, depend on the uses to which the index is being put.

So rating indices will be relatively more suitable where the index is being applied to the whole class of risks than for those uses where it is being applied to individual risks. For monitoring class profitability or reserving for a whole class, for instance, a rate index will be useful even if the class is fairly heterogeneous.

However, for making underwriting decisions on an individual risk, the rating index will only be useful where it is relevant to the particular risk, i.e. where the basket of risks used to construct the index is homogeneous.

- (b) Rating indices will in general be less predictive of claims experience where it is heavily dependent on a very volatile frequency. For instance, a rating index may be useful to predict average claims experience for a catastrophe class, but will not be predictive of the results of a specific year. In this case it may be more useful to use a different form of index, for example a retrospective index once catastrophe experience is known.

## **7 Variability of indices**

In using indices we need to be aware that the index number could be very variable. That is, the observed index may not reflect the true rate changes appropriate to the use being made of the index. This may arise for a number of reasons, including the index being subjective, inaccuracy in the measurement of rate changes, or because only a sample of contracts was used.

There are some premium indices, which are effectively amalgams of other rating indices. For instance the Lloyd's indices are constructed by joining the indices from individual syndicates or managing agents. Variability in the underlying indices, and the method of joining the indices together, will contribute to variability in the total index.

There will be variability between component indices even if they are measuring risks in the same class. This could arise because of differences in the risks being measured, as a result of heterogeneity or simply because the risks are being written within different corporate targets.

Even if different indices are attempting to measure the same premium rating by looking at essentially the same risks they may still give rise to differences. This could for instance be caused by different construction methods.

Therefore if an individual organisation is comparing its internal indices with available market indices it will need to consider whether any differences are due to

true differences in the organisations business compared to the general market business, or whether it is just random variation.

## **8 Some methods used to monitor premium rate movements within a company and relative to the market.**

The following section describes each of the methods used by a direct writer to try and monitor how premiums are changing in motor and household insurance.

1. What If
2. Mystery Shopping –Phone
3. Mystery Shopping –Internet
4. AA Price Index

The various advantages and disadvantages are shown for each of the methods.

### **What If**

ISL's "Whatif" system is used to give up to date quotes on a monthly basis for both household and motor insurance.

### **Method used**

A portfolio of 50,000 home and motor risks are produced each month which can be run against any of 93 products (Household) and 203 products (Motor)

### **Advantages**

- Can run very large basket of risks to give more significant results
- Identify monthly changes in premium across a wide range of risks
- Identify areas where own product out of line with the market
- Identify rating structures for competitors
- Can run risks against new potential rating structures to see how changes competitive position

### **Disadvantages**

- Only has broker products and so can't compare against direct writers who are main competitors
- No commission amounts / Broker discounts so not cost to consumer prices
- Potential for dummy rates to be included which may give inaccurate results

### **Mystery Shopping - Telephone**

#### **Method used**

An external company is used to mystery shop our 10 main direct insurer competitors for 200 risks for both home and motor insurance. The process is repeating quarterly for motor and twice a year for household

#### **Advantages**

- The quotes generated are against your real competitors so you have a more realistic idea of how competitive your product is

#### **Disadvantages**

- Direct writers change their rates more frequently and so data quickly out of date
- Mystery shopping is very expensive to do
- Because of expense only small sample sizes can be used which limits use of the data
- More chance of errors with data from mis-interpretation by mystery shopper
- Mystery shopping is a very time consuming exercise

### **Mystery Shopping - Internet**

Mystery shopping using the Internet is becoming a more and more useful tool for tracking how premiums in the general insurance market place are changing.

#### **Advantages**

- Quicker and less expensive if small analysis is needed
- Can be done as often as required so can even monitor how a direct writer changes their rates on a daily basis if necessary

#### **Disadvantages**

- As with telephone mystery shopping this is still quite time consuming to generate the quotes as it takes just as long to get an on-line quote as it does to get one over the phone
- Websites and servers are not that reliable
- Not all main competitors have an on-line distribution channel

There are a couple of companies who are currently introducing a similar concept to the “WhatIf” model but which integrates direct writers



## **AA Price Index**

This is a market guide produced quarterly by the AA that shows the price changes for household and motor insurance

### **Advantages**

- Gives a overall measure of how the market is changing and is generally used by most areas of the market
- Ran quarterly and same risks used for past 6 years giving good trends data
- Can be found on-line at [www.theaa.co.uk/insuranceandfinance/insuranceindex/index.asp](http://www.theaa.co.uk/insuranceandfinance/insuranceindex/index.asp)

### **Disadvantages**

- Only bases information on a small sample of risks (50 for each product)
- Only uses the AA brokered panel so doesn't include direct writers rates

## **9 Rating indices available in the market**

The working party are aware of the following rating indices:

- Lloyd's Premium Rating Index
- CBSL Market Rate Index
- Moodies Underwriting Index
- Tillinghast-Towers Perrin Premium Rating Index

All four issue summarised details of their index and Moodies have said they will supply more details for a fee.

## **10 Practical Use of A Rating Index**

The following describes a rating index that is being used by a managing agent.

The basic assumption underlying any tool used to monitor rating levels is that in order to underwrite any particular risk the underwriter must understand the nature of the exposures involved and therefore the appropriate premium to charge for that risk. In doing so, the underwriter therefore has an expectation of the profit that will be made from writing that risk. If this isn't the case, how does the underwriter determine the correct premium to charge for any risk?

The underwriter is asked to estimate the expected profitability of each risk written during a period assuming an average loss experience for the period exposed. The underwriter is not required to opine on what the actual loss experience will be for each risk. The actual loss experience will arise as a function of the monitoring process.

A rating index is determined explicitly using one of the methods below:

### **Risk Specific Ultimate Loss Ratios**

This method is appropriate for low volume, high premium contracts (i.e. Casualty Treaty business). Normally this type of risk is underwritten following extensive review of the renewal information. The claims and exposure information is considered in order to derive an estimate of the likely claims cost of the contract to be written. This process allows for exposure, claims inflation and IBNR (Incurred But Not Reported) claims as well as the specific limits of the particular contract. Explicit allowances are made for expenses, profit margins, investment income and brokerage/commission.

This claims cost can then be compared to the actual premium in order to estimate the ultimate loss ratio for the contract. This ultimate loss ratio is recorded on the system allowing portfolio reports to be produced. The tracking of the portfolio ultimate loss ratios over time allows a rating index to be produced.

### **Benchmarking**

A rating model is produced for each class of business. This rating model produces a technical premium for each risk. The rating models are reviewed and updated on a regular basis to ensure that they accurately reflect the nature of the current market conditions.

This technical premium is recorded on the system allowing portfolio reports to be produced comparing the technical premium with the actual premium. The tracking of portfolio summary reports over time allows a rating index to be produced.

### **Subjective Judgement**

For each risk or portfolio, the underwriter uses subjective judgement to estimate the movement in the premium rates that has occurred over the period. Combining these judgements allows a rating index to be produced.

The above analysis is conducted gross of outward reinsurance. Outward reinsurance is treated in a similar manner with the theoretical reinsurance cost being compared against the actual. The actual reinsurance costs are allocated to a class of business level and compared with the expected recoveries. After adjusting for expenses and investment income the expected profitability can be measured on a regular basis.

Internal audit procedures are in place to monitor and validate the assumptions being made by the underwriters.

A critical part of the work is to ensure that the portfolio is segmented to a sufficient degree so that each part contains risks that are homogeneous in nature.

## Appendix A: questionnaire

### GIRO 2001

#### Rating Index Questionnaire

The GIRO 2001 Rating Index Working Party is conducting a survey into the use of rating indices. We would be grateful if you would complete this questionnaire. The results will not be presented in a form where the individual or company can be identified.

Please respond to: Philip Archer-Lock  
 B&W Deloitte Tel: 01372 824011  
 Horizon House Fax: 01372 824801  
 28 Upper High Street e-mail: parcher-lock@bw-deloitte.com  
 Epsom  
 KT17 4RS

**Please respond by: 10 July 2001**

1. What type of organisation do you work for?

Insurance Company	
Reinsurance Company	
Lloyd's Managing Agent	
Consultancy	
Other (please specify)	

2. Does your organisation use rating indices? YES/NO

If no, please go to question 6

3. Please define the rating indices used.

4. What are the rating indices used for?
5. Please describe how the rating indices are constructed
6. What other potential uses do you think there are for rating indices:
  - (a) for your organisation?
  - (b) generally?
7. What rating indices do you know of (in addition to those in (3))?
  - (a) Internally constructed (by your or another company)
  - (b) Externally constructed
8. What issues do you think there are with the construction of rating indices?

If you wish to make any other comments please do: