INFLATION

Introduction

When an underwriter considers a revision of premium rates for a particular class of business he is forced, either implicitly or explicitly, to make a number of assumptions regarding the future progress of the account. If he were able accurately to predict each of the relevant variables he would be able to assess exactly the eventual profit or loss that would emerge. Unfortunately many of these assumptions are subject to considerable variability and these uncertainties form the principal reason for the maintenance of solvency reserves. In recent times in the UK one of the most far reaching of these assumptions has concerned inflation. This directly affects claim costs and expenses and less directly the level of reserves and the return on investments. This note examines the problems of assessing inflation and the extent and significance of the potential errors in its estimation.

Sources of Error

One of the first problems is to decide what is meant by inflation of claim costs. A particular account will have a variety of different risks included in it. An Employer's liability account which contains a spread of industrial activity ranging perhaps from mineworking to office staff is a good example of this. These risks are likely to suffer inflationary forces in different ways and it is desirable to distinguish between them in rating. In practice it may well prove very difficult to make such distinctions other than in a broad way and so the inflationary assumption made in the rating process will suffer from a change in the mixture of the account.

A similar problem can arise at the individual policy level where claims can arise from a variety of different sources. An example is Motor insurance where at least two distinct types of claim occur - damage claims and injury claims. These are subject to

inflation in very different ways. Damage claims are inflated by changes in the cost of spare parts and garage labour costs, while injury claims are affected by levels of damages awarded by courts and by the personal circumstances of the claimant in an assessment of loss of future earnings. A number of different rates of inflation apply and for rating some combination of these must be taken. Once again there is the risk of a change in the proportions of the types of claim. In Motor business this frequently occurs in a spell of bad weather where the damage claims become more prevalent. Another example occurs with package policies which contain a number of different covers. In a household policy which includes building and contents insurance the inflationary element will vary depending on the type of claim and so the eventual cost will depend on the proportions of each type.

In some classes of business, notably liability, claims cost inflation does not progress in a smooth way. Settlements are often based on court awards given in the past for claims of a similar nature. This process usually means that awards are subject to step increases followed for a time by a plateau. It is clearly very difficult for the underwriter who must predict both the occurrence and the size of such increases. There is an interesting statistical effect caused by these factors - the tail of the claim amount distribution becomes extended as time passes. This happens because of the treatment of the large claims. For a given year of occurrence the smaller claims are settled faster and so the larger ones are subject to a greater exposure to inflation. In addition it is usually the larger claims which go to court, often precisely because of the difficulty in reaching agreement on the amount payable. The court is then faced with making the subjective decision and frequently a step increase of the kind described above results.

Government legislation is often unpredictable and can affect claims costs significantly. The increase in the rate of VAT in June 1979 caused an immediate increase in costs in many areas of insurance. The fact that this type of change affects not only future claims

but also those in the course of settlement worsens the effect. The imposition of a lower speed limit in the energy saving campaign caused a reduction in both the frequency and severity of motor claims. In these direct ways and many other indirect ways, legislation can have a disturbing influence on the inflationary trend.

Two very important influences on the inflation of claims cost relate to the account itself. One concerns the size of the account and the other the speed of settlement. The speed of settlement of claims can have a large influence in the extent of the inflationary impact. A short-tailed account will be exposed to inflation only between the setting of the rates and the date of reporting of the claim but a long-tailed account will have some claims which stretch some years past this period. An estimate of the settlement period is thus an important part in the assessment of inflation. This leads us to the possibility of variation in the settlement period as a source of error. It appears that some companies set out with the deliberate policy of settling claims quickly, arguing that this reduces costs and more importantly reduces the final settlement amount. Where there is a decision to attempt to quicken settlements there will be a consequent reduction in the influence of inflation.

The size of the account has a strong influence on the variance of the claim amount distribution. If the account is small the amount of claims will be highly variable. In this case an accurate assessment of inflation for the purpose of rating is out of place. It is likely that the rates will follow the market and the account will be reinsured to an appreciable degree. The larger the account the less volatile will be the claim amounts and so the more important will be the influence of inflation and the more serious the effect of an error in the inflation assumption.

The factors described above demonstrate how difficult it is to decide on an inflation assumption in relation to an underwriting account. An even more fundamental problem arises because of the inherent variability of price inflation and wages inflation in the economy. It is common practice in estimating a rate of claims

inflation to start with the forecasts of inflation on one of the common indices, for example, the retail prices index, the index of durable household goods or the index of employees' earnings. This may then be modified to account for some of the influences discussed above. This process unfortunately leads to two more sources of error. The forecast of the index may be wrong and the use of the modified index as a proxy may not be very representative of what happens to the account. The tables below show the progress of two of the main indices with the average settled cost of two fairly large accounts for comparison. A detailed comparison of these figures would be misleading because of possible distortions in the accounts, the influence of time lags, etc., but the difficulty in making reliable forecasts can be clearly seen. For example, suppose someone was setting motor rates in late 1975 from these figures, what is the likelihood of a correct forecast that settled costs would increase by less than 20% over the next two years?

Significance of the Errors

Having seen how difficult it is to make a realistic assessment of the rate of claims cost inflation it is necessary to examine the significance of making an error in terms of premium income, say. For simplicity, we assume that we are dealing with private motor business and that we are adopting a traditional approach to underwriting. In this we ignore the question of investment proceeds and the need for financing of solvency reserves and calculate the premiums based on a fixed level of underwriting profit. Expenses are assumed known and expressible as a fixed amount per policy. The premium rating equation might then look as follows:

Premium = (1 + commission rate) x (claim frequency x current average claim cost x inflation factor + expenses)

Using this basic equation and making assumptions about the delay periods it is possible to establish the period over which inflation operates. We assume that rates are set three months before the date of their inception and are based on average costs for the previous six months. Also assume that the rates will

(a) Index Values

Year	Retail Price Index	Employees' Earning Index	Average Cost Liability	Average Cost Motor
1972	100.0	100.0	100.0	100.0
1973	110.6	112.5	110.9	112.3
1974	131.7	145.6	117.9	139.7
1975	164.5	173.4	145.1	193.5
1976	189.3	192.7	161.2	216.2
1977	212.3	212.5	181.9	233.9
1978	230.1	244.4	179.6	250.1
1979	269.8	291.4	207.7	278.7
1980	310.6	337.1	219.0	338.2

(b) Percentage Increases

Year	Retail Price Index	Employees' Earning Index	Average Cost Liability	Average Cost Motor
1973	10.6	12.5	10.9	12.3
1974	19.1	29.4	6.3	24.4
1975	24.9	19.1	23.1	38.5
1976	15.1	11.1	11.1	11.7
1977	12.2	10.3	12.8	8.2
1978	8.4	15.0	-1.3	6.9
1979	17.3	19.2	15.6	11.4
1980	15.1	15.7	5.4	21.3
Ave.	15.2	16.4	10.3	16.5

apply for a full years renewals and that the average period between occurrence and settlement is nine months. Then if we are calculating rates for renewal year 1982 the average date of occurrence is 1st January, 1983, the average settlement date 1st October, 1983 and the base average cost is as at 1st July 1981. Thus the inflation period is 2¼ years. On this rather simple model the effect of a 10% error in the estimated rate of claim cost inflation will cost around 18% of premium income. In terms of underwriting profit and solvency margins this is a disturbingly high figure. Usually a cautious approach would be adopted for the inflation assumption and so the likelihood of such an error occurring and resulting in an underestimate of the time rate may not be great. In times of overcapacity in the market, however, rates are determined as much by market pressures as anything else and perhaps the possibility of serious error is increased.

In this analysis a relatively short-tailed class of business has been examined. In the long-tailed classes the problems are increased particularly in liability classes with the possibility of very long term industrial disease claims. For such cases the inflationary element will form the greater part of the settlement. Consideration of longer-tailed business brings to mind two particular areas which we have hitherto ignored - the need for reserves for outstanding claims and the ability to earn investment income on these reserves.

Reserving and Investment Income

As claims occur, reserves are set up to meet the eventual cost of those claims. These are for the full liability, that is including all inflationary increases between the date of occurrence and settlement. Once again there arises the possibility of an error in assessing the rate of inflation that will apply. In a sense the problems are not as great in reserving as in rating because market forces are not present to the same extent. It is possible to adopt a cautious approach to the inflation assumption and the net result will be merely to delay the release of profit. If a similarly cautious approach was adopted in premium rating it might

well turn out to be impossible to write business at the resulting level of premiums because of market competition. A glance at various companies' returns to the Department of Trade shows that it is usual to adopt this cautious approach to reserving and that as time passes releases are made from these reserves. There are one or two notable exceptions to this particularly on employers liability business where the increasing incidence of industrial disease claims has caused estimates to be increased.

The question arises of how significant an inflation error in this context is. The potential size of the error is comparable with that in the premium basis as there is a balance between having rather more knowledge about the claims than at the rating stage and the fact that it is the larger more volatile claims which remain outstanding longest and so form a higher proportion of those outstanding. On the other hand, there is the question of investment income. Because of the way that reserving is done, to include full future inflation, the fact that investment income can be earned on these reserves is ignored. The investment income as it emerges is thus immediately available as profit since it will not be needed to pay the claims. An alternative approach is of course to discount the claims reserves at a rate of interest which is by some margin less than the return on the investments. The effect of this is exactly equivalent to underestimating the inflation element in the claims reserves by a similar rate. While as at present no discounting is allowed, there is a cushion available against underestimation of inflation provided by this investment income. An inflation error therefore assumes rather less significance.

It might be thought that a similar argument would apply when setting premium rates. There is a distinction though in that in reserving, the investment income is actually ignored but in premium rating its acount and existence will be assumed and allowed for. On a traditional approach this allowance may be restricted to a decision about the level of underwriting profit (or loss) that is acceptable but even then the investment income will have been accounted for. There is one area where there may be a trade off of inflation error against investment return. This is to the

extent that the rate of inflation and return on investments move in line. If all investments were held short it might be possible to derive a relationship here, but with the existence of long term assets the effect of a change in the market rates will be of less significance. This whole area is very complex and without deep analysis all that can be said is that there is a potential trade off.

Conclusions

The potential errors in the estimation of inflation in the premium basis can be significant. The position in worsened by such factors as changes in the mix of business, speed of settlement etc. As regards inflation assumptions in reserves these are of less significance because of the usual cautious approach and because of the cushion of investment income on reserves.