UNEXPIRED RISK RESERVE (URR)

Now called "Additional Amount for Unexpired Risks"

The only formula I have ever seen for calculating the URR (and the one
applied by the DTI) basically requires that the total premium reserves
at the end of a year should be:- (Claims ratio for the year) x (Unearned
premiums at end of the year). If the result exceeds the Unearned Premium
Reserve (UPR) then the difference must be set up as URR. This seems
unobjectionable until one analyses the components of each term.

Taking the claims ratio as (Claims arising during the year) : (Earned premiums
for the year) it is clear that part of the earned premiums (EPs), with
corresponding claims, comes from the UPR brought forward from the previous
year. If that previous year's premiums were adequate to support the claims
(so that the UPR then needed no supplementing by URR) but the premiums written
in the current year (which usually provide roughly half the EPs for the year)
are insufficient to carry the resulting claims then the claims ratio for the
year will be about half-way between the low ratio appropriate to the previous
year's carry-forward and the high ratio appropriate to the earned portion of
the current year's premiums. This is an inadequate multiplier for the current
year's unearned premiums (UPs) to which the undiluted high ratio ought to be
applied.

Reverse the situation so that the previous year's premiums were too low, the
current year's rates being satisfactory, and the formula can produce a URR
when it is not needed.

The implicit assumption that the claims ratio appropriate to the EPs (even
after eliminating the effects of the carry-forward from the previous year)
is a suitable multiplier for the UPs can also be a mistake. If inadequate
premiums are charged for only part of a year their contribution to the year's
EPs will vary according to the months in which they were in use whilst their
effects on the UPs will vary in the opposite direction (e.g. if the period is
early in the year they will make a substantial contribution to the EPs but
little to the UPs, and vice versa if the period is late) so the formula is
liable to produce results bearing little resemblance to the real need. In
a business such as Motor, where rates need frequent revision, it would not
be difficult to find a rating series to be inadequate for the whole period
it was in force; even more likely in an inflationary era would be to find
rates inadequate for business effected towards the end of the life of a rating
series.

As a check on these diagnoses, and to get some measure of their effects, I
did a few trial calculations with highly idealised examples and these, with
my assumptions, are shown in the Appendix. The trials confirm expectations
and the presence of both overstatements and understatements of the true reserve
in the calculated figures should provide food for thought to both offices and
DTI.

It will be seen from lines 20/21 of the calculations that an unnecessary URR
can be eliminated by adding the previous year's URR to the EPs for the year
(an obvious adjustment once it has been pointed out) but there remains a
problem in determining the proper value of this URR. Once the concept of
inadequate rates applying for only part of a year has been introduced there
appear to be considerable difficulties in the practical calculation of an
accurate amount even for the offices, and much more so for the supervisory
authorities.

It seemed that there ought to be some improvement if the UPR brought
forward and the corresponding claims were taken out of the formula, but
lines 22/24 of my calculations show that this idea produces distortions
that could be worse than before.   This approach is another way of eliminating
the unwanted URR derived from the previous year's inadequate rates so would
be attractive if its errors could be avoided.

I have established that the calculation of the URR poses problems, but I
have yet to find a satisfactory practical solution.   Offices no doubt will
have some idea of when their rates were inadequate and could, therefore,
estimate their contribution to EPs and UPs;   they might, however, find it
difficult to determine the claims arising from these EPs.   Knowing how
much of the UPR is derived from inadequate rates suggests that the URR
could be calculated by applying a percentage deficiency factor, but the
calculation of this factor also requires that the appropriate claims be known
and there would then remain a problem to determine how much profit there is
in the remainder of the UPR for offset against the deficiency.   The problems
are far worse for the supervisory authorities with the limited data available
to them (particularly the claims for a year being one individed figure) so
any solution they can produce is unlikely to yield more than a very rough
approximation;   we should, however, hope that they will not expect a URR
when it is unnecessary.

The rather complicated formula that the DTI applies in practice (recognising
that real business covers more than the straightforward cases I have
considered in making the above analysis) contains features that are liable
to produce distortions even if the basic principle was correct.   Four
points that merit comment are:-

(a)   The premiums employed in the formula are a mixture of items,
        some taken direct from the returns and hence as calculated
        by the office, some taken from the Department's calculations
        of unearned premiums (using the 24ths method) as a check
        on the accurac y of the office's work.   Where there is a
        biassed difference between the office's and the Department's
        calculations (there is plenty of scope for this in the 24ths
        method) the selection of the terms going into the formula
        seems designed to ensure that the distortions in the answer
        are maximised.

(b)   Both the premium and claims figures in the formula are net
        of reinsurance.   Where the reinsurance is arranged as a
        proportion of the original contract (e.g. Surplus or Quota
        Share) I presume offices will analyse the premiums by months
        in the same way as the gross premiums so that calculations
        of UPs (whatever the method) will be properly comparable
        between the gross and reinsurance premiums.   An Excess of
        Loss treaty, however, is divorced from any original policy
        and is arranged by many offices to cover the same period as
        their financial year.   If the premium for the treaty is due
        at the beginning of the year, and shown in Month 1 of the
        premium analysis in the statutory returns, there will be no
        UP for this contract at the end of the year, the whole premium
        being offset against the gross EPs.   (The 24ths method will
        produce 1/24th as the UP).   Hence as far as this treaty is
        concerned the UPs (in the numerator in the formula) will be

gross and the EPs (in the denominator) net.   There is obvious scope for similar, if reduced, distortion if the X/L premiums are paid quarterly in advance.   No doubt it could be arranged for such premiums to be spread over the months before applying the formula but an easier answer would be to employ only gross premiums leaving the netting-down for reinsurance to be dealt with in the claims figures alone, the answer should be about the same.

(c)   The claims in the formula are the office's estimate of their cost plus the costs of settling them, also as estimated by the office.   Hence the weaker the office's standards for claims reserves the smaller the URR emerging, which seems the opposite of what the supervisory authorities should be aiming for.

(d)   The formula adds to the result of these calculations a term (of an amount equal to half the year's management expenses) said to be the DTI's estimate of the costs of winding-up the office.   Whilst it seems perfectly reasonable for the Department to check that the reserves are adequate to look after such a contingency I can see no legal or logical justification for making it part of the URR.

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8.7.85

APPENDIX

Tests of the Principles Underlying the Calculation of the Unexpired Risk Reserve as applied by the Department of Trade and Industry

These tests are intended purely for the purpose of investigating the mathematics of the method so all extraneous influences have been eliminated. Thus it is assumed that:-

(a)   There is no commission and expenses

(b)   The premium income is distributed evenly throughout each year and the 24ths method of calculating unearned premiums is accurate.

(c)   The claims occur evenly throughout any period, are reported immediately and the amounts are known accurately at once.

(d)   The policies are all standard 12-month contracts, with no movements during the year.

(e)   There is no reinsurance and no inflation.

For the examples an office is assumed to have been writing for a long time a constant amount of business for £2,400 of annual premium each month, on which the claims for the year also amount to a steady £2,400.   During year Y it reduced the rates of premium by 20%, then restored them to their former level 4 months later.   During the period of the reduction the number of policies did not change and the claims continued at their normal level of £2,400 per annum for each month's business.

The period of the reduction was given varying commencing dates, avoiding any that would cause the period to spread into year Y + 1.

Each month's normal business produces earned premiums accruing at £200 per month against which arise £200 of claims.   Whilst this situation continues there is no need for any URR.   The reduced premiums produce a monthly accrual of £160 so there is a monthly deficiency of £40 against the claims, providing a direct measure for calculating the URR required.   At the end of year Y + 1 all business then in force is back to normal terms so again no URR is needed.

The data set out overleaf can now be deduced.

TRIAL CALCULATIONS

		1 January	1 March	1 May	1 July	1 Sept.
1.	Commencing Date of Period					
2.	True URR needed at 31/12/Y	320	640	960	1,280	1,600

Experience for Year Y

		1 January	1 March	1 May	1 July	1 Sept.
3.	UPR brought forward at 1/1/Y (all Normal)	14,400	14,400	14,400	14,400	14,400
4.	Written Premiums (WPs) in Year Y	26,880	26,880	26,880	26,880	26,880
5.	UPR carried forward at 31/12/Y:-					
	Normal Premiums	12,800	11,200	9,600	8,000	6,400
6.	Reduced Premiums	1,280	2,560	3,840	5,120	6,400
7.	Total	14,080	13,760	13,440	13,120	12,800
8.	EPs from WPs in Year Y (= 4-7)	12,800	13,120	13,440	13,760	14,080
9.	Total EPs in Year Y (= 3+8)	27,200	27,520	27,840	28,160	28,480
10.	Claims in Year Y	28,800	28,800	28,800	28,800	28,800

Calculation of URR at 31/12/Y

		1 January	1 March	1 May	1 July	1 Sept.
11.	Claims Ratio x UPR (= 10÷9x7)	14,908	14,400	13,903	13,418	12,944
12.	Deduct UPR (= 7)	828	640	463	298	144

Experience for Year Y+1

		1 January	1 March	1 May	1 July	1 Sept.
13.	UPR brought forward at 1/1/Y + 1 (= 7)	14,080	13,760	13,440	13,120	12,800
14.	WPs in Year Y+1 (all Normal)	28,800	28,800	28,800	28,800	28,800
15.	UPR carried forward at 31/12/Y + 1 (all Normal)	14,400	14,400	14,400	14,400	14,400
16.	Total EPs in Year Y+1 (= 13+14-15)	28,480	28,160	27,840	27,520	27,200
17.	Claims in Year Y + 1	28,800	28,800	28,800	28,800	28,800

Calculation of URR at 31/12/Y + 1

		1 January	1 March	1 May	1 July	1 Sept.
18.	Claims Ratio x UPR (= 17÷16x15)	14,562	14,727	14,897	15,070	15,247
19.	Deduct UPR (= 15)	162	327	497	670	847

Revision of URR calculation at 31/12/Y + 1

		1 January	1 March	1 May	1 July	1 Sept.
20.	Claims ÷ (EPs + True URR 31/12/Y) x UPR (= 17÷(16+2) x 15)	14,400	14,400	14,400	14,400	14,400
21.	Deduct UPR (= 15)	0	0	0	0	0

URR calculation at 31/12/Y excluding carry-forward from Year Y-1

		1 January	1 March	1 May	1 July	1 Sept.
22.	Claims in Year Y from WPs in Year Y (half of 10)	14,400	14,400	14,400	14,400	14,400
23.	Claims in 22 ÷ EPs in 8 x UPs in 7	15,840	15,102	14,400	13,730	13,091
24.	Deduct UPR (= 7)	1,760	1,342	960	610	291