CONTROL OF ON-LINE TRANSACTIONS

by

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A serious problem facing the actuary when his company converts to on line transactions processing is that of how to minimize human errors. The traditional techniques of consistency checking carry over but the availability of the various reserve and cash value factor files in an on line environment permit better checking than has been possible in the past.

The Rationale

To many staff members, the accounts are nearly sacred and they will take elaborate precautions to ensure their accuracy. The reserve liabilities are less understood and repercussions less likely, so that most administrative personnel take a more relaxed attitude to the need to properly control the movement in reserves and their accuracy. The result often shows up in missing records on a master file with the premiums, etc. carefully, but improperly, stowed away in expense accounts or in the correct places. Where records are changing from a deferred file to a vested file, too often they are lost or duplicated.

Once errors of duplication and omission are minimized, experience suggests that a comparison of the reserve movement and the accounts will catch a significant number of accounting and calculation errors which would otherwise escape detection.

For both these reasons, it is important to check, on a transaction by transaction basis, the movement of accounts and reserves.

The Basic Concept

The reserve at the beginning of the year is increased by premiums received and interest credited to the reserve. It is decreased by surrenders, death claims, maturities and the cost of insurance. Of these 6 items, three have counterparts in the ledger and three do not. Of the three that do, two are major components of the ledger (premiums and surrender benefits) and, hence, well worth controlling.

The movement in the reserve for a policy for a calendar year can be calculated as follows:

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Reserve on 1/1 $\dfrac{_t V + P + _{t+1}V}{2}$

Premiums: The net premium used in the year end reserve
calculations can be prorated for the portion of
the year the policy is inforce. On change
transactions, the old net premium is used
from January to the transaction effective
date and the new one for the balance of the
year.

Interest: Interest should be calculated for the period
the policy is inforce on the initial reserve.
Depending on the theoretical assumptions
underlying the reserve, interest on the net
premium should be allowed for all or part of
the period.

Reserve released by surrender: This is the true reserve on the
effective date of the surrender. It is easiest
to calculate if one interpolates between the
initial and terminal reserves for the year
and then deducts the net premium for the
period from the effective date to the next
policy anniversary.

Reserve released by death: this can be calculated in a
similar fashion to the reserve released by
surrender.

Reserve released by maturity: this is simply the face amount.

Reserve on 31/12 $\dfrac{_{t+1}V + P + _{t+2}V}{2}$

Cost of insurance: the balancing item.

With a little forethought and planning these calculations
can be made fairly precise.

The movement in the accounts can be made compatible
with the reserve movement as follows.

Reserve on 1/1: From the reserve calculations.

Reserve on 31/12: From the reserve calculations.

Reserve released on death: From the reserve calculations
for most insurance products. On annuities
and retirement income policies beyond the a
period, the death benefit paid can be handled
in the manner described below for surrender
values.

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Reserve released on maturity: The maturity benefit can be
          used directly.

Reserve released on surrender: The surrender value paid
          can be converted to a reserve as follows.

$$(CSV-NP) \frac{_t V}{CSV_t} + NP \approx \text{reserve released,}$$

          where CSV   is the cash surrender value paid,
                CSV_t is the cash surrender value factor
                   on the anniversary preceding surrender,
                NP is the net premium for the period
                   from the preceding anniversary to the
                   effective date of the surrender,
                $_t V$ is the terminal reserve factor on
                   the anniversary preceding surrender.

Net Premium: The actual gross premium income for the
          policy times the ratio of net to gross (adjusted
          for the policy fee factor, if any).

Interest: The interest using the valuation interest rate,
          the reserve on 1/1 and the net premium income
          calculated from the gross premiums.

Cost of insurance: The balancing item.

          The reserve released by surrender is best calculated
in the manner indicated above for a simple reason. At the
early durations, much of the cash surrender value is a return
of the current year's premium and this amount should not
be grossed up to reflect the differences between cash values
and reserves. If it is grossed up, serious errors result.

          In theory, these two methods should produce
identical costs of insurance, except for rounding errors.

                    Practical Results

          As with any approximate method, there are
always differences between the results. The cost of
insurance field is used as a balancing item because its
relatively small size makes it sensitive to errors. Also,
the whole method has the limitation imposed by the medial
reserve system - namely that the medial reserve assumes
that the whole year's premium has been paid while the

reserve released on death, surrender or maturity assumes only those premiums are paid that are in fact paid. The discrepancy affects the cost of insurance field in this method.

The check is made by calculating the difference between the two costs of insurance. The difference should be less than one half of a modal premium. The ratio of the difference to the January 1 medial reserve should be less than 1% [If the January 1 medial reserve is zero, the net annual premium can be used.]

At the early durations, before the cash values are significant and at the longer durations where a year's interest exceeds the annual premium, the comparison with one half the modal premium is the most informative as the ratio test is too sensitive at the early durations and insensitive at the longer durations. At the intermediate durations the ratio test is best.

In most instances, the valid differences are under .6%. The method is sensitive enough to catch errors as small as a single month's error in interpolation on cash values. On policy changes, small differences in cash values, not supported by premium income or surrender values paid, can be detected.

Deferred Annuities

Since companies have taken in vast amounts of annuity income over the last 15 years, the applicability of the method to annuities is important. Fortunately, the method is even better suited to annuities than to life insurance. For annuities, the reserve released on death can be approximated by the death benefit paid, adjusted in the same manner as for surrenders. The reserve released on maturity becomes the reserve released on vesting. The cost of insurance field is replaced by the survivorship cost, which is normally zero, but the field still functions as a remainder field and can be used for checking.

The error should be at most .5%, reflecting the fact that the cash values are larger and closer in value to the reserves.

Vested Annuities

There is a surprising amount of activity upon the vested annuity file. Besides new entrants, deaths and payments, commutations are common as are increases in policies used to fund pension plans. Furthermore, varying money market interest rates can result in frequent dividend scale changes which must be processed on the anniversary. All of these factors make checks on the vested annuity processing important. The same basic system works.

Summary

The comparison of the movement of the reserves and the accounts provides a good,basic check for completeness and for the accuracy of manual processing.