Life modelling techniques in banking

Harvey Chamberlain shows us how actuarial skills can be applied to solve problems within banking.

Describe a typical real banking/actuarial problem that you have been involved in solving recently?

The bank has progressively increased its requirements to analyse the sources of profit. The results are needed in order to improve performance measurement and forecasting. Analyses of the source of profit by product group and channel highlighted the need for more granular analyses, and an understanding of the cohort/lifetime view. The problem therefore came down to differentiating the profits at a more detailed product level and cohort.

How did you solve the problem using banking/actuarial techniques and thinking?

Work initially took place to develop Excel models to forecast interest income. The models allowed for the various product interest rate structures and balance repayment/reinvestment mechanisms. Monthly income was then modelled using the seriatim inforce customer data, and assumptions were made as to new sales, new sales product mix, switching from other products, and various decrements. We also allowed for decrements such as attrition, default, and maturity.

The initial models were used as the basis for retail product volume and income targets for the 06/07 financial year.

These models were subsequently developed into Excel-based profit and loss models, with calculations of non-interest income, bad debts, expenses, and capital – that is, full profit test-type models. These models were then used to inform pricing decisions for various retail products.

Further to this analysis, plans are currently under way to convert the models to PROPHET. The models are then potentially useful to fulfil more sophisticated pricing approaches and expand planning to non-interest income. More sophisticated pricing approaches may be necessary to fulfil 'use test' requirements under Basel II regulatory requirements for advanced capital measurement.

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Were other professionals/bankers involved in solving the problem and how did you work together?

Yes. There are several subject matter experts within the organisation, with whom good working relationships are essential. These include:

- Investment experts with the Treasury department who control, among other things, the reference fund transfer pricing basis. This is the reference index for apportioning the net investment income between asset (lending) and liability (deposit/savings) products.
- Credit risk specialists, who are the only source of:
  - the credit risk assumption basis (a life actuary's equivalent of mortality assumptions – probabilities of default, loss given default, and exposure at default);
  - provisioning basis (specific provisions and collective provisions, including the IBNR allowance – a life actuary's equivalent of actuarial reserves); and
  - capital bases (and how to reflect the transition from the current Basel I to the Basel II requirements, and modelling capital elements which are not necessarily correlated with product drivers).
- Accounting professionals within the financial reporting team who understand the formula underlying the various shareholder performance metrics and provide the expense details necessary to derive per-unit product-specific expense assumptions.
- IT and customer data specialists who hold the key to access customer data as used for model point creation, attrition studies, and per-unit expense assumptions.

What lessons have you learned?

Some key lessons are:

- To recognise that as an actuary, our concepts and techniques are not necessarily understood or accepted outside an insurance environment, so we should not underestimate the amount of engagement necessary to obtain buy-in.
- Not to underestimate the time required to source experience data to support assumptions. Often experience has never been collected in the form suitable for assumption setting so involvement is necessary to specify experience requirements.
- To ensure that the data requirements, methods, assumptions, and results, together with any limitations, are clearly communicated, using the bank's terminology wherever possible.
- That there is a lot to be learnt from actuarial techniques for modelling and assumption setting, as applied to life insurance. For example, there was previously no appreciation of:
  - the need to model the run-off of the inforce (back-book) and incidence of sales (front-book) as a means to derive total volume and margins; or
  - the need to differentiate and measure attrition and default rates by homogenous factors, eg differences by duration since inception or guaranteed versus variable rates.

More generally, do you see actuaries in banking as a natural fit?

Yes. For banks wishing to adopt advanced capital assessment under Basel II, more sophisticated models for pricing are likely to be required to fulfil 'use test' requirements. Actuaries would be comfortable with implementing the techniques underlying these models.

There are also various other areas within banks where actuaries could be involved given their training, though it must be recognised that there are very capable non-actuarial specialists who are also suitable for these fields. Examples of such areas are:

- treasury, eg within the investment decision-making process, design of the fund transfer pricing basis, ALM modelling;
- credit, eg as technicians with advanced statistical techniques (such as GLIM) are required for designing creditworthiness scorecards and deriving probabilities of default (and other default metrics).
- capital, eg in order to carry out statistical calculations underlying advanced capital bases and modelling the capital impact of management decisions.

This article is one of a series promoted by the Action Group for Banking (AGB) and explores situations where the actuarial and banking worlds overlap to the benefit of both sectors. The case studies serve the following broad purposes:

- Push: to demonstrate where actuarial skills and thinking have been applied in a banking or financial context to add real commercial value.
- Pull: to highlight tools and skills available in banking and finance that may be of use to traditional life and pensions actuaries.

For more information on the AGB's activities, please contact the author at *harvey.chamberlain@eu.nabgroup.com*