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Letter from the Editor

by Thomas Nace

George Allen, former head coach of the Washington Redskins, had a motto: the Future is Now. As we enter a new century (for real this time), those words seem truer than ever.

Many of you may remember how utterly futuristic George Orwell's novel, *1984*, seemed to readers back in the middle of the just completed century. Who would have thought that when he portrayed the emergence of Big Brother, Orwell was actually prognosticating the advent of the most unsuccessful reality TV show to air at the end of the 20th century. (The future is now?)

Or take the epic movie, 2001, *A Space Odyssey*. A talking computer named Hal goes haywire and takes control of a space ship and the passengers on it. When this movie hit the silver screen back in the late 60's, was anyone really thinking of the Y2K bugs that would hit at the end of the century? (The future is now?)

Seriously, though, the beginning of a new year and a new century is accompanied by reflective thoughts as to the potential which our profession and our Section can achieve. The world, as well as our industry, will continue to evolve through many changes in this and the upcoming years. How we as actuaries are able to adapt to these changes, or more importantly, how successful we are at being able to take an aggressive role in shaping the future of our profession, will influence the significance which the actuary will possess in the future.

Starting with this year, this day, we can build onto the foundation of an already strong, viable profession in order that the actuary next year and the year after will be part of a profession which can prosper and grow and make a difference. What we do today will certainly

Stochastic DAC Unlocking for Variable Annuity Products

by Alastair Longley-Cook, Dick Shaw, Mike Sherrill, and Jay Vadiveloo

As variable annuities have become an increasingly important share of assets under management for many insurers, the issue of how to deal with Deferred Asset Cost (DAC) unlocking for a product with such volatile profit streams has become a primary concern. A volatile stock market and stricter guidance from the SEC on materiality and earnings management have compounded the problem. Current deterministic practices for handling DAC amortization according to FASB 97 have become problematic. New methods are needed. One possibility developed by the authors, and found to be effective in practice, utilizes stochastic modeling of profit streams and a corridor approach to unlocking.

The products we have addressed are deferred annuity products in the accumulation stage, subject to FASB 97 accounting, and having a significant variable (equity) fund component; however,

the method could be applied to variable life insurance products as well. Before describing the new approach, a brief review of current practice and its limitations will help define the issues.

Current Practices

Under FASB 97, most acquisition expenses are deferred. A deferred acquisition cost asset (DAC) is created and amortized in proportion to the present value (PV) of future margins earned. This process is normally performed by issue year and utilizes an amortization rate at issue (AR_0) such that:

$$DAC_0 = AR_0 \times (\text{PV of future margins}).$$

The DAC balance is adjusted (unlocked) periodically to recognize actual margins earned and any changes in projected margins. For each accounting period:

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DAC at beginning of the period
+ interest earned on DAC
+ new capitalizations
− DAC amortization
+ (−) DAC catch-up
= DAC at end of period.

The DAC unlocking process involves the calculation of a stream of historical and projected margins for each business block, or cohort, as of time t. A revised amortization rate (AR_t) is then calculated for each cohort using the amount capitalized at issue (DAC_0) such that, on a present value basis:

$DAC_0 = AR_t$ x (PV of historical and future margins).

Then the revised, or unlocked, DAC balance at time t (DAC_t) for each cohort is calculated as:

$DAC_t = AR_t$ x (PV of future margins).

The DAC catch-up then equals the unlocked DAC balance less the current DAC balance. A positive catch-up is a contribution to GAAP earnings; a negative catch-up is a reduction to GAAP earnings.

According to current practice, DAC unlocking is generally done annually. In the past, some companies have spread the DAC catch-up equally over the coming four quarters. Some companies have performed quarterly unlocking, but frozen the year-end AR's for the coming year. Generally, DAC unlocking is based on a *single* set of assumed future margins (deterministic approach).

Limitations of Current Practices

Current practice does not adequately address the volatility in actual and future margins (and DAC catch-ups) caused by volatility in equity returns. This volatility affects the retrospective as well as prospective aspects of the unlocking calculation. Large swings in the equity markets during a reporting period cause large swings in the DAC catch-up. In effect, retrospective and prospective deviations from previous assumptions are collapsed into the current reporting period, resulting in a leveraged volatility in GAAP earnings.

To deal with this problem, some ad hoc adjustment techniques have emerged. Among them are:

♦ Projecting a market correction in the future to avoid a significant DAC catch-up;
♦ Use of a conservative level future equity return rate;
♦ A disconnect between the retrospective and prospective calculations, with changes reflected in one but not the other.

Strict interpretation of FASB 97 may be in conflict with such adjustment techniques. For instance, Paragraph 23 states, "Estimated gross profit...shall be determined based on the best estimate of that individual element...without provision for adverse deviation." This may cause a problem for the first two methods, and the third is questionable from a consistency standpoint.

In addition, the increased focus by the SEC on management of earnings and the potential abuse of the "materiality" safe harbor may prevent audit approval of such techniques and disallow any phase-in of DAC catch-up.

In a June 1999 enforcement action, the SEC determined that W.R. Grace used "excess reserves" to manipulate their reported quarterly and annual earnings. Subsequently, the Chairman of the SEC, Arthur Levitt, made it clear in his pronouncements that the management of earnings through "cookie jar" reserves would not be countenanced. The complete Grace enforcement action can be found at *http://www.sec.gov/enforce/adminact/34-41578.htm.*

In August of 1999, the SEC promulgated SEC Staff Accounting Bulletin No. 99 - Materiality, which expressed the view that "Exclusive reliance on certain quantitative benchmarks to assess materiality in preparing financial statements and performing audits of those financial statements is inappropriate; misstatements are not immaterial simply because they fall beneath a numerical threshold. The bulletin can be found at *http://www.sec.gov/rules/acctreps/sab99.htm.*

Certain practices, not in conformance with GAAP but permitted as immaterial, have become untenable. With these clarifications of the accounting framework intent, current deterministic approaches with ad hoc adjustments, including any kind of catch-up phase-in, may no longer provide acceptable solutions to the volatility issue. The stochastic DAC unlocking approach was developed with this in mind.

Stochastic DAC Unlocking Model

Rather than using a single deterministic projection of future profit margins from the variable accounts, these profit streams are generated stochastically. Future equity returns for the projection period are randomly generated using an equity model reflecting historic patterns appropriate to the equity funds being considered. Variable fund balances are generated based on these random returns. Variable margins are then calculated based on best estimate spread assumptions. Projected fixed margins are projected deterministically using best estimate assumptions. No conservatism is factored into any of these calculations.

Each set of projected profit margins generates an unlocked DAC balance and associated AR. From these, a distribution of aggregate DAC balances is constructed. A corridor is defined between two predetermined percentiles. The current DAC balance is then compared to the distribution of unlocked DAC balances. If current

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DAC falls within the corridor, no catch-up results. If current DAC falls outside the corridor, the catch-up equals the amount needed to bring the DAC balance to the nearest corridor boundary.

The stochastic DAC methodology provides established confidence bounds to avoid the use of arbitrary or inconsistent future equity return assumptions. If the current DAC balance is within the corridor, the future equity return assumption that produces it is deemed acceptable as a best estimate, and no catch-up results. If the current DAC balance is outside the corridor, the future equity return assumption that produces it is deemed unacceptable as a best estimate. A new future equity return assumption is then determined that results in the closest corridor boundary as the unlocked DAC. The catch-up equals the amount needed to bring the current DAC balance to the

nearest corridor boundary, and this amount can be viewed as the minimum catch-up needed to make the future equity return assumption acceptable as a best estimate. The width and position of the corridor will depend on several considerations, including the shape of the unlocked DAC distribution, existence of product guarantees, expectations regarding future equity market performance, etc. All things being equal, a fairly narrow corridor, say 10-20%, centered around the distribution's mean may be appropriate, e.g., 45%-55%. If, however, there are valid reasons for including an element of conservatism (as none has been included so far), then a corridor to the left of the mean (i.e., lower DAC balances) may be appropriate, e.g., 15-30% (approximately 1/2-1 standard deviations below the mean).

Despite FASB 97's prohibition against a specific provision for adverse deviation, the general concept of conservatism is permitted. Paragraph 57 states, "Conservatism may suggest the more conservative of two equally likely alternatives should be used in an accounting measurement." In this case, one could argue that the alternatives represented by the left half of the DAC distribution are equally likely as the right half. Choosing the left half, as a conservative measure, may be appropriate in the presence of greater than normal uncertainty regarding the equity markets or significant product guarantees. The corridor within the left half provides a criterion for a conservative best estimate for GAAP purposes.

As an example of the above case, consider the following charts, where the curve represents the distribution of unlocked DAC balances, the corridor is set at 15-30%, and the arrow indicates the current DAC balance. In the first chart, the current DAC balance (arrow) is in the corridor, so no catch-up is necessary.

Distribution of Possible DAC Values
DAC in Corridor - No Catch-up
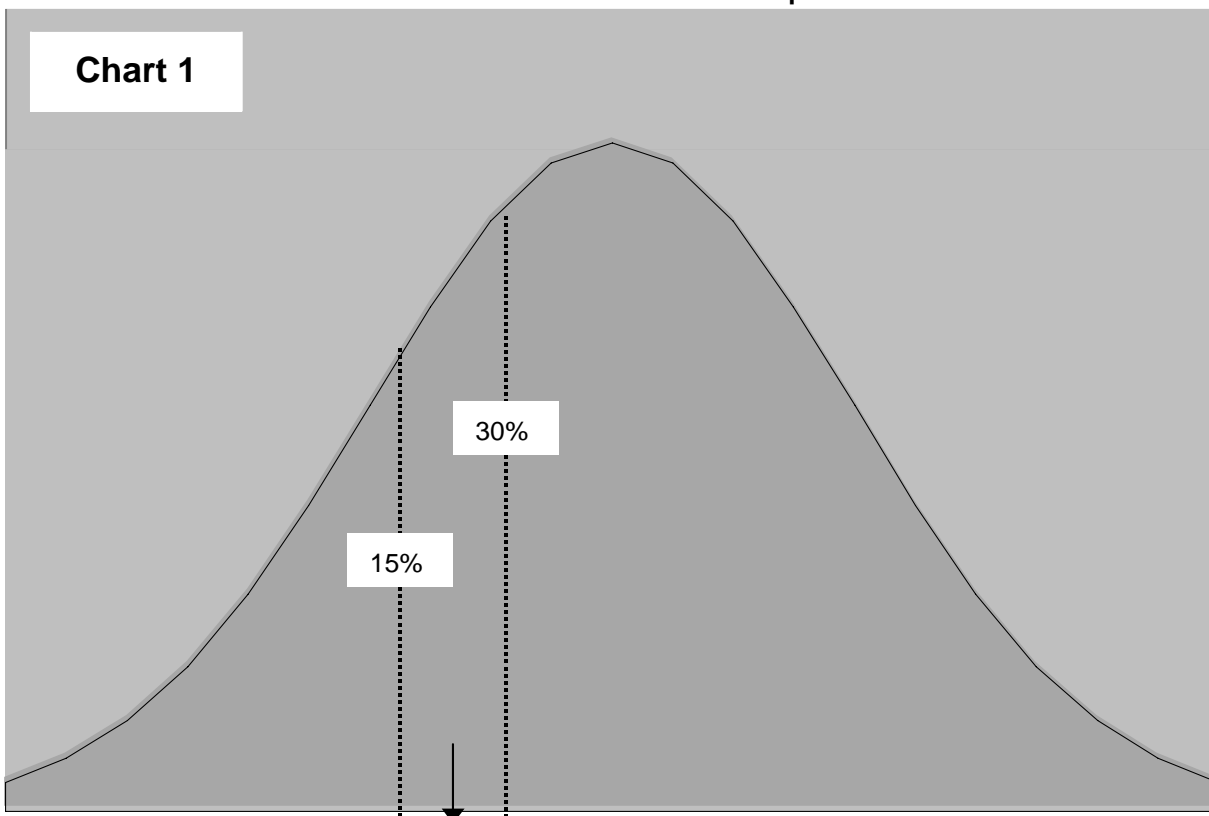
Chart 1

In the second chart, the current DAC balance is below the corridor, so a catch-up is necessary to bring it to the left edge of the corridor as shown in the third chart. The amount of the catch-up is the distance the arrow moves.

Distribution of Possible DAC Values
DAC Below Corridor – Positive Catch-up Required

Chart 2

30%

15%
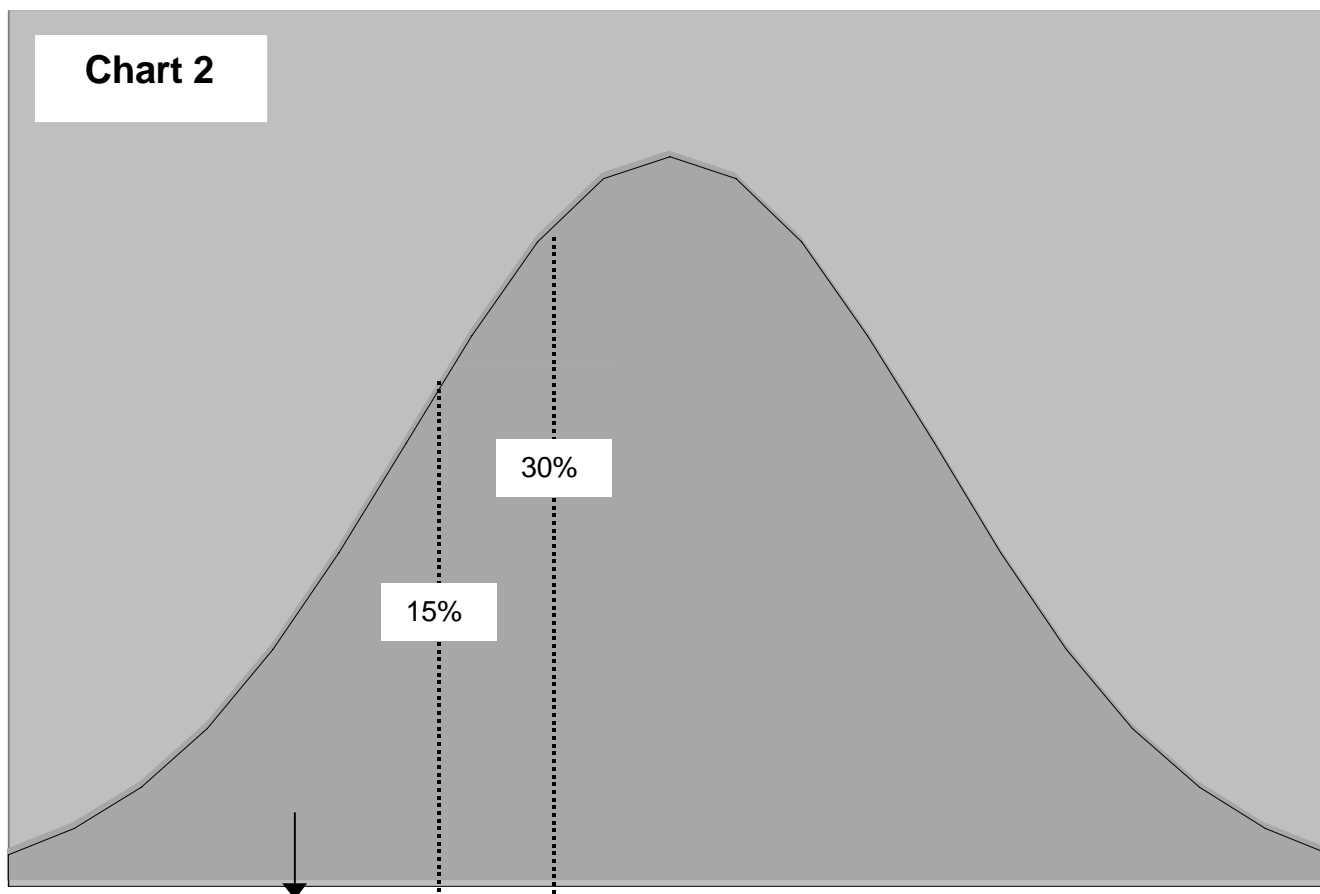
Implementation Issues and Possible Solutions

Clearly, additional work is required to perform stochastic DAC unlocking. Some of the implementation issues along with possible solutions are discussed here.

First, a capital-market scenario generation system is needed to produce a reasonable probability distribution for equity returns. In some straightforward cases, a normal distribution with a long-term average historical mean and standard deviation may be adequate. Refinements to such a standalone equity model could include a fatter-tailed distribution and the assumption of mean reversion. Depending on the fund being

modeled, adjustments to reflect the characteristics of the specific fund may be appropriate. If the characteristics are significantly different, individual funds may need to be modeled separately. Distribution parameters also need to be modified if the funds have a fixed income component.

It may also be appropriate to incorporate dynamic lapse assumptions in the model (i.e. higher lapses/transfers when returns drop). Ideally, a capital-market scenario generation system with internally consistent equity returns, interest rates, and policyholder behavior assumptions should be used to produce a distribution of profit margins that reflect all material parameters.

We have found it advisable to start off with a baseline *deterministic* projected set of margins using best estimate assumptions and a long-term average equity return. The baseline run can then use the company's valuation system to generate projected fund values and margins. The stochastic model can be built off this baseline run using a spreadsheet model.

The mean of the stochastic DAC distribution should be close to the DAC of the baseline run. If done quarterly, simplification techniques could include basing the current quarter's catch-up on the prior quarter's inforce, and freezing AR's based on year-end unlocking. Allocation of catch-up to business blocks

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Distribution of Possible DAC Values
DAC After Positive Catch-up

Chart 3

30%

15%
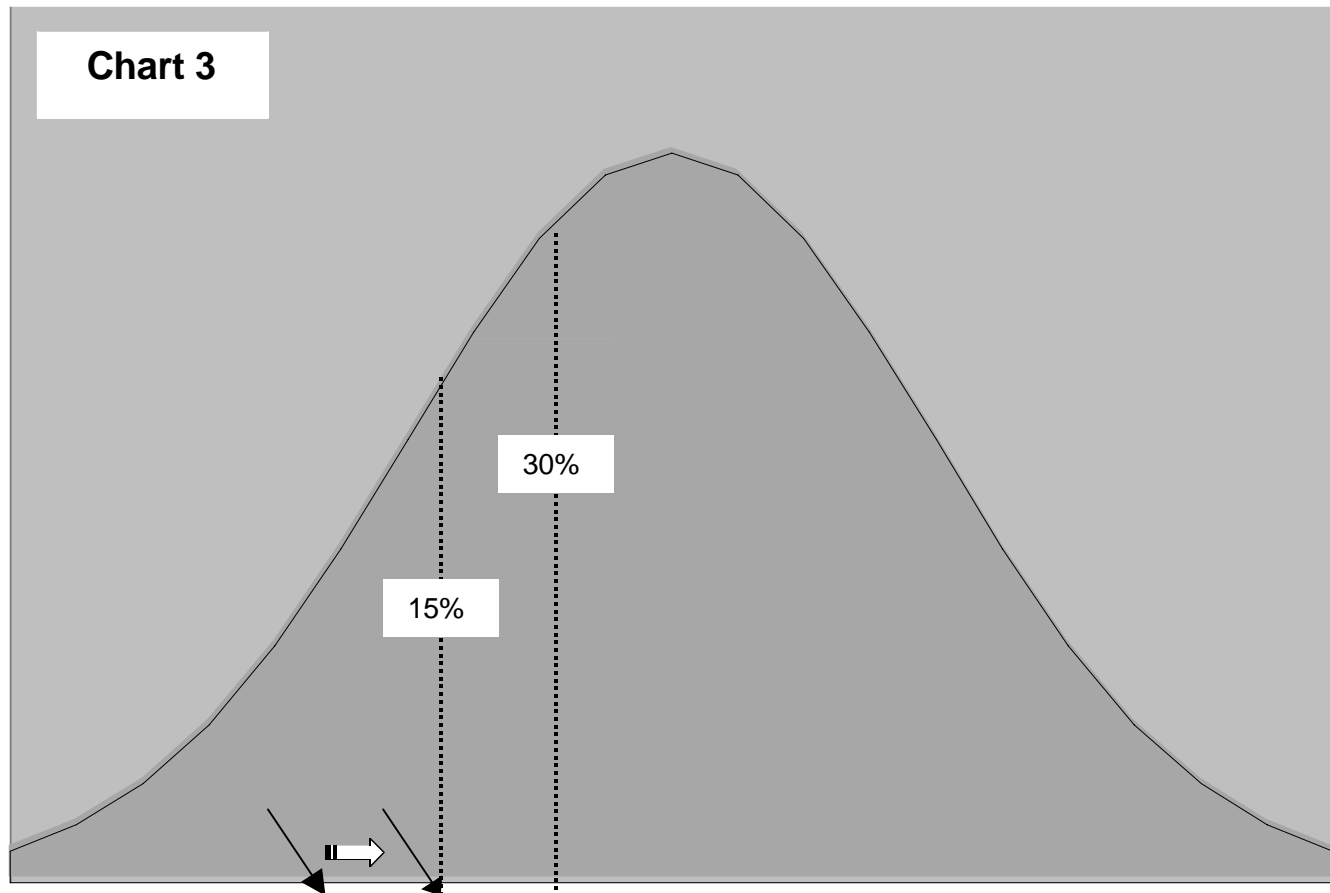
can be based on current DAC balance by business block.

To facilitate audit approval, stochastic models and assumptions should not be too complex, nor constitute a black box. Building the model off a set of projections generated by a baseline valuation system makes it easier to audit, as does proper documentation of procedures, creation of audit trails, and ongoing communication.

Conclusions

The stochastic DAC unlocking approach reduces the leveraged volatility in the DAC catch-up caused by short period market swings. It also avoids perception of "manipulation" of assumptions to avoid unplanned swings in earnings due to DAC catch-up volatility. It is consistent with FASB 97 and the movement towards fair value accounting. In addition, the distribution of future profit margins allows for a risk analysis of the company's exposure to adverse capital market scenarios.

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