

My Model Works – Now What?

PBA Background and Practical C3P3 Considerations

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Agenda

- PBA Background
- Practical Considerations for C3P3 Implementation, Validation, & Control

PBA Background

- History
- C3 Calculation Basics
- Other implications and Considerations

Background

- PB initiative started about 7 years ago
 - current reserve formulas and factor driven RBC do not adequately recognize modern annuity and life insurance product features, key aspect of all these features is tail risk
 - Tail risk is characterized by low probability events with high severity
 - ❖ VA guarantees were original drivers
 - ❖ UL with no lapse guarantees
 - ❖ EIA's now have VA type guarantees

- First phase was C3 Phase 2 for VA PBC – 2005

- Next phases:
 - VA CARVM for VA reserves – year-end 2009, retrospective
 - C3 Phase 3 – RBC for life insurance and non-variable annuities, including EIA's and single premium life – target is year-end 2009, retrospective
 - PB reserve for life insurance and non-variable annuities – target is for states to receive new valuation manual by YE 2009 and approve for YE 2010
 - ❖ Prospective (new business) only
 - Health insurance?

C3 Calculation Basics

- Model risks stochastically unless no material tail risk demonstrated
 - use exclusion test provided by guidelines or company developed demonstration to avoid stochastic
 - ❖ Can use current factors if successful
 - burden on actuary

- TAR for a scenario is amount of assets needed to mature liabilities

- Amount determined using GPVAD concept - find the PV of the largest asset deficiency at any point in time and take absolute value
 - deficiency = available assets – working reserve
 - ❖ Working Reserve = CSV, 0 if product has no CSV
 - worst point in time preserves CARVM framework
 - discount rate is 105% of 1 year treasury

- Business Segment minimum TAR = CTE(90?) based on all scenarios
 - minimum CTE level for reserves still under discussion

C3 Calculation Basics

- Minimum C3 RBC = CTE(90?) TAR less stat value of liabilities on policies included in the business segment, as reported on the valuation date
- Stochastic calculation uses Prudent Estimate Assumptions
 - Anticipated Experience Assumption plus a margin
 - Blend of company, industry, and prescribed experience
 - Guidelines on how margins should be determined
- Calculation is post-tax
 - Reserves are pre-tax
 - Tax reserves are still uncertain – two big issues are discretion in assumptions and need for seriatim amounts

Other Implications & Considerations

- Current duplicative components will be eliminated, for example C1 CARVM allowance factor
- Expected financial impacts not yet known unless company has been keeping on top of things
 - C3P2 did not generate incremental capital regulators had hoped
- There is not yet a standard scenario as with C3P2/VACARVM
- Big change in the way we do go about our business
 - Better integration of valuation and pricing functions
 - ❖ Stochastic on stochastic pricing?
 - Improved opportunity for capital and risk management
 - Conveying clear messages to senior management. BOD's, etc.
 - SOX for stat likely in some form

Implement, Validate, & Control

- Receive and test initial extract
- Prepare extract for model
- Input into projection system
- Model Control
- Assumptions
- Practical modeling considerations
- Materiality
- Review and finalize results
- Hardware considerations
- ❖ **We have many decisions and considerations that are of no concern in a formula/factor driven world**

Receive and Test Inforce extract

- Source is either admin system or database populated by admin system
- Must be complete and accurate – do not take for granted
 - all policies and their corresponding benefits
 - all fields accurately populated
- Policies should have benefits/indicators that policy form allows for and should not have benefits/indicators policy form does not allow for
 - recommend setting up database showing all policy forms and related benefits
 - need strategy for handling material benefits omitted from extract
 - look closely at business resulting from an internal replacement or status change, for example:
 - ❖ paid up or extended term should have no premiums due
 - ❖ Current age on internal exchanges = original issue age + duration since original issue or age on exchange date + duration since exchange (don't mix and match)

Receive and Test Inforce extract

- Number of policies and account values should roll forward logically
 - advisable for IT to provide initial sign-off, perhaps crosschecking to admin system information
 - Also tie to other systems such as general ledger (especially assets)

- Trend test and/or perform outlier analysis on key parameters
 - number of policies
 - account values
 - face amounts
 - Gender distribution
 - Age distribution

Prepping Extract for Model

- Can involve adding and populating fields, or re-formatting extract
 - possible approach for handling benefits excluded from original extract
 - one method for adding assumption indicators such as decrement scale or free partial withdrawal method
- Same types of controls as for original extract should be applied to both original fields (nothing should have changed) and added fields
 - example: annuity products should not get life insurance (LI) mortality indicators
- Initial simple control is to check for fields that are erroneously left blank or default to zero or some other illogical value

Feed into CF Projection System

- What will be modeled stochastically and what will not be?
 - Exclusion Test to demonstrate risk does not warrant stochastic
 - ❖ perform annually
 - ❖ may need to re-do if there is a material subsequent event
 - may want to do stochastic even if exclusion test passed
 - may be able to use alternative amount if exclusion test failed
 - ❖ annually demonstrate adequate conservatism at a level comparable to the stochastic CTE calculation
 - there is provision for a non-modeled amount for immaterial liabilities

- Need controls to make sure nothing is lost or changed

- Grouping considerations
 - Aggregating in-force with same risk profile should not materially change the result
 - Could be performed in prep process or by the system
 - Controls needed to assure grouping performed accurately

Model Control

- Modeling is a manual process subject to human error
 - Develop and rigorously enforce a peer review process – critical need, especially with an open model where staff writes modifications
- Change management process needed for new products and assumptions, system upgrades, and custom modules
- Maintain checklist to be sure everything that needs to be coded is coded correctly
- Document everything not inherent to system – if it is not documented it did not happen

Assumptions

- Must be documented and supported
 - blend of company, prescribed, and industry experience
 - also need a documented re-assessment process
- Many products means many tables to develop and code
- Manually code indicators if not done in prep process
- 2 sets to keep track of – anticipated experience vs. prudent estimate
 - what should margins be? guidelines provided, expect regulator scrutiny
 - conservative for reserves may be liberal for capital
 - CFT assumptions may not be appropriate
- Many LI mortality tables to consider using scoring process
- Consider annuity spousal continuation privilege
- Use fully allocated expenses plus a margin

Practical Modeling Considerations

- C3P3 is for all inforce - many products (including riders), product generations, reinsurance treaties, compensation scales, etc.
 - all systems have limitations
 - some provisions will likely require a customized module, work-around assumption, or manual adjustment
 - ❖ reinsurance and CDHS require precise A&L modeling, either within the CF model or outside of it, to get benefit cost reduction
 - ❖ budget time for customization appropriately
 - reconciliations to existing models may not be straightforward
- Coordinate with asset model – timing, asset segments, reinvestment & disinvestment policies vary by line of business
 - may need to model assets held by reinsurer if performance critical to CF's
- Non-fixed income investments (including derivatives and separate accounts) backing liabilities must have their returns mapped to an investment category/proxy index
 - some assets are hybrids

Practical Modeling Considerations

- Which scenarios will be used?
 - home grown generator will take time to develop (criteria not final)
 - ❖ demonstrate/document applicability of proprietary non-stochastic
 - ❖ calibration criteria, for both interest rates and equity returns, must be met even if AAA scenario picking tool used
 - Could differ by business segment, but aggregation requires consistent scenarios
 - choice must be justified and documented

- Non-Guaranteed Elements (NGE's)
 - Response to changes should mirror company practice and limitations
 - ❖ e.g., dividends usually change slowly and only on certain dates
 - If uncertain about ability to effect changes, add a margin that would increase modeled amount

- Review revenue sharing arrangements for certainty of receipt
 - could need legal assistance
 - may need to include a margin for uncertainty

Practical Modeling Considerations

- Determine length of projection period for each block – tail events lengthen liabilities
- Consider timing of model cash flows vs. accounting accruals
- Post-tax calculation (reserves are pre-tax) – will have to consider:
 - Stat vs. tax reserves – reasonable approximations ok, there is a default method (f-factor method of C3P2)
 - items not directly related to future CF's such as:
 - ❖ NOL carry forwards
 - ❖ DAC tax
 - ❖ DRD (separate accounts)

Materiality

- Comes in to play when considering (among other things):
 - length of projection period
 - projection time step
 - grouping of inforce
 - application of hedging strategy
 - using a simplified approach
 - number of scenarios
 - using a proprietary, non-stochastic or stochastic based set of scenarios
 - error handling
- Conclusions will likely differ by business segment
- Definitions could differ for reserves vs. capital
- Corporate considerations – can't think of your own product in a void

Review Output and Finalize Results

- Use system's audit trail, check error log and resolve issues
- Are results explainable?
 - many moving parts => results may not be intuitive so leave sufficient time for analysis and sensitivity tests
 - ❖ will be needed to respond to management and SID inquiries
 - Perform trend testing and try to develop metrics
 - Off year-end periodically sample calculations, especially when there have been changes
- Leave time for re-runs – the problem-free year-end is rare
- Sample policies/cells to verify correct assumptions used
 - Simple first step is an outlier analysis, e.g., PVFDB ≤ 0 for life insurance
- What CTE level? CTE(90) is min., higher could improve company rating

Review Output and Finalize Results

- Bring results forward to valuation date if not done in model
 - allow time to develop and test a methodology – many considerations
 - more challenging with complex/market related assets/liabilities
 - rerun needed if results close to a regulatory action point – due date not yet determined
 - Rerun may be needed to recognize a material subsequent event
 - document methodology and explain its validity – will need to accommodate material changes in assets, including effectiveness of hedging strategy, liabilities, and reinsurance

- How will business segments be aggregated to determine scenario amounts

- Make manual adjustments
 - source of factor adjustments must be documented
 - sample for accuracy, i.e., right adjustment to right segment
 - add in non-modeled amount

Review Output and Finalize Results

- Inspect all spreadsheets used to arrive at final result
 - Pay special attention to links, download and cut & paste operations
 - Check for consistent use of formulas
 - Document and keep up to date with appropriate security

- Need procedure to allocate reported amount between C3a and C3c components of RBC formula
 - If not 100% to one component, analysis will be needed

- Prepare reports and certifications
 - Have boilerplates and supporting documentation ready before year-end
 - CDHS and derivative programs have their own specific requirements

Hardware

- Requires adequate computing power – don't underestimate
 - independent server farm recommended to avoid competing for company-wide CPU availability
 - ❖ Corporate wide tasks, C3P2, etc.
 - will take time to set up and test

- Full inforce can take a long time to run

- Many runs possible
 - first run is prior to valuation date
 - Re-run may be needed if incorrect
 - could re-run to reflect changes since date of first run
 - sensitivity tests and other runs to improve understanding
 - PBR is coming

Questions?