OLIVER WYMAN

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PROFITING FROM PROPHET

WELCOME TO OUR PROPHET NEWSLETTER!

Editor's words: We are pleased to present the inaugural edition of Oliver Wyman's Prophet modeling newsletter. On a semi-annual basis, we aim to keep you abreast of significant system features and capabilities as they relate to industry hot topics, as well as providing some useful tips and tricks for navigating the system. This issue focuses on the modeling impact of FASB's ASU2018-12 update, colloquially referred to as US GAAP ("GAAP") Long Duration Targeted Improvements ("LDTI"). Please look for our second edition later in 2019!

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MARSH & McLENNAN COMPANIES

EXECUTIVE CORNER

MODELING CONSIDERATIONS FOR LONG DURATION TARGETED IMPROVEMENTS

INTRODUCTION

In August 2018, FASB released ASU 2018-12, commonly known as LDTI, representing the largest change in GAAP standards in four decades. The updated standard prescribes changes to future policy benefit liabilities, Deferred Acquisition Costs ("DAC"), Market Risk Benefits ("MRBs") and disclosure requirements for a variety of product types. Companies who invest in actuarial modeling enhancements and timely implementation in advance of the January 1, 2021 effective date[1] will earn the ability to present go-forward financial results in an optimal fashion.

This article provides a summary of the key accounting changes resulting from LDTI as well as an overview of likely challenges and changes to actuarial modeling processes.

"The level of effort required to implement LDTI changes will depend on the state of existing actuarial models and available LDTI-consistent functionality. These changes create an opportunity for your company to evaluate its actuarial modeling processes and systems."

1. The effective date for non-public companies is January 1, 2022

SUMMARY OF LDTI

Exhibit 1: Summary of LDTI

	LIABILITY FOR FUTURE POLICY BENEFITS	DAC	MARKET RISK BENEFITS
Valuation	• Assumptions for traditional contracts are no longer locked-in and are to be reviewed at least annually • Discount rate to be based on the yield of an upper-medium grade security and updated at each valuation date. The impact flows through OCI • No provisions for adverse deviation or maintenance expenses • At transition, companies can utilize the modified retrospective method by which the difference between revised and existing liabilities flows through retained earnings • The Net Premium Ratio ("NPR") is capped at 100% and loss recognition is no longer required	• DAC is to be amortized on a straight-line basis, replacing the multiple approaches currently in place • Amortization to be based on either an individual or a grouped contract basis • Interest is no longer credited to the balance • Sales inducement assets and unearned revenue to follow new DAC guidance • DAC is no longer subject to an impairment test	• Contracts with protection for more than nominal capital market risk are categorized as having MRBs • All MRBs to be valued on a fair value basis (includes GMIB, GMAB, GMWB, GLWB and GMDB) • Fair value changes attributable to instrument-specific credit risk in liability position to be reported in OCI • Contract provisions that are not deemed to be MRBs but meet the embedded derivative ("ED") definition to follow ED fair value guidance
Presentation and disclosures	• Remeasurement reported as a separate line of the income statement • Disaggregated rollforward and qualitative and quantitative disclosures on transition adjustments required • Additional disclosures required around inputs, assumptions, judgments, and methodology used in measuring liabilities • Qualitative and quantitative disclosures regarding net premiums capped at gross premiums required	• Disaggregated rollforward and qualitative and quantitative disclosures on transition adjustments required	• Reported separately on the balance sheet • Disaggregated rollforward and qualitative and quantitative disclosures on transition adjustments required • MRBs to be reported separately on the balance sheet and income statement

The above changes reflect a shift towards increased simplicity and transparency in GAAP reporting. The remainder of this article presents certain modeling implications attributable to each of the three pillars above.

LIABILITY FOR FUTURE POLICY BENEFITS

Key products impacted	Traditional life, payout annuities

LDTI affects the assumptions and disclosure requirements associated with future policyholder liabilities, with the following modeling implications:

Exhibit 2: Future policyholder liabilities modeling implications

STEP	COMPONENT	LDTI REQUIREMENT	MODELING IMPLICATIONS
1	**Discount rates**	• Cash flows are discounted using upper-medium grade fixed income instrument yields • Discount rates are updated at each valuation date	• Modeling and unlocking discount rates may present operational challenges for legacy systems • The reserve impact attributable to the change in the discount rate will need to be captured
2	**Annual cohorting**	• Liability cohorts may not contain policies across different issue years	• Challenges may arise for existing cohorts that contain multiple issue years
3	**Assumption unlocking**	• Cash flow assumptions are based on best estimate assumptions with no PADs • Assumptions are to be reviewed at least annually and updated if necessary	• The flexibility of the prior assumption input process may be stressed by the required assumption updates • Actuarial processes will need to recognize the impact of cash flow assumption updates on policyholder liabilities
4	**Disclosures**	• Present a disaggregated account balance rollforward along with average credit rates, cash values, buckets by guarantee and amounts in excess of guarantee • Disclosures require additional information when net premiums are capped at gross premiums	• Additional model runs and output will be required for enhanced liability disclosures

DAC

Key products impacted	All long duration products

LDTI simplifies the amortization process for DAC and DAC-like balances (e.g., sales inducements, unearned revenue, etc.). While the calculation basis is straightforward, companies should consider the following when updating their models:

Exhibit 3: DAC modeling implications

STEP	COMPONENT	LDTI REQUIREMENT	MODELING IMPLICATIONS
1	**Straight-line amortization**	• DAC is amortized on a straight-line basis	• DAC modeling becomes more transparent and consistent across products
2	**Seriatim DAC**	• DAC can be amortized on either an individual contract basis or a grouped contract basis that approximates individual • Groupings must be consistent with the groupings used for future policy benefit liabilities	• Seriatim DAC modeling allows for companies to easily aggregate DAC consistent with the groupings used for future policy benefits liabilities • Your company may wish to model the financial outcomes of various DAC cohort options to determine the preferred approach
3	**Amortization basis**	• DAC is amortized over the life of the contract • The insurer will need to choose a basis for amortization if the grouped approach is used	• Your company should take care in defining "life of the contract" in its valuation processes • Your company may wish to test multiple amortization bases (e.g., insurance in force, annual premium, etc.)
4	**Disclosures**	• Disaggregated DAC rollforward required, including capitalization, amortization and termination	• Additional model runs and output will be required for enhanced DAC disclosures

MRBs

Key products impacted	Fixed and variable annuities

LDTI defines an MRB as "a benefit offered by an insurer that protects a contract holder from capital market risk." Under LDTI, the goal is to create a more uniform methodology to measure MRBs; however, these changes present challenges for companies whose existing MRBs have not been measured on a fair value basis. Companies with MRBs should consider the following:

Exhibit 4: MRB modeling implications

STEP	COMPONENT	LDTI REQUIREMENT	MODELING IMPLICATIONS
1	**Fair value measurement**	• All MRBs are combined and measured on a fair value basis • Fair value of MRBs may be either positive (an asset) or negative (a liability) • FIA embedded derivatives continue to be valued separately at fair value	• Measurement requires the use of actual assumptions from MRB inception[2] • May require development of risk-neutral stochastic projections
2	**Classification**	• MRBs are classified and valued under either an option based or a non-option based approach • Non-option based valuation approaches include attributed fee and swap calibration	• Your company may wish to consider what approaches can be handled by existing modeling software
3	**Attributed fee approach**	• For MRBs valued using an attributed fee approach, the attributed fees are capped at actual fees	• Fee capping may cause a non-zero initial fair value. This initial amount is interpreted as an off-market issued derivative and needs to be recognized over time
4	**Disclosures**	• The carrying amount and fair value changes are presented on the balance sheet and income statement • Changes in the fair value of the MRB attributed to instrument-specific credit risk are presented in OCI	• Modeling processes need to be able to isolate changes in the fair value of the MRB attributed to instrument-specific credit risk • Carrying amounts and fair value changes must be included in model output

2. Hindsight may be used only if historical data is unavailable

CONCLUSION

LDTI creates various modeling challenges for insurers. The level of effort required to implement LDTI changes will depend on the state of existing actuarial models and available LDTI-consistent functionality. These changes create an opportunity for your company to evaluate its actuarial modeling processes and systems.

Enhanced disclosure requirements impact the corresponding granularity of required model outputs. Further, assumption unlocking and fair value requirements may necessitate the development of entirely new processes depending on the characteristics of your company's inforce business. The following newsletter article discusses in detail how Prophet's LDTI solution addresses these modeling challenges.

TIPS & TRICKS

Table generation and maintenance

The 'Prophet Professional' user interface ("UI") is an often unappreciated tool to support table creation and updates. Prophet has the ability to scan the code of existing products to automatically populate many table indices. The range of functionality varies by table type.

All references to tables within the product defined through variable definitions or READ functions can be generated in this manner. By leveraging this functionality to create and update tables, the modeler can ensure tables have all required variables, saving time and reducing the risk of error.

Remember to:

Create a new table using 'Initialise…' to automatically generate table indices

- Available for generic tables, flexible tables, global files, parameter files, and table of tables

Expand the scope of existing tables to cover more products by using 'Add Products'

- Available for parameter files and table of tables; i.e., tables which have an innate product dimension
- Automatically imports all required variables associated with selected products into the table

Refresh existing tables for changes through 'Add Variables'

- Available for generic tables, flexible tables, global files, parameter files and model point files
- Allows the user to quickly scan a product to an existing table, adding the required variables which did not exist previously

IN THE SPOTLIGHT

LEVERAGING PROPHET FOR YOUR LDTI IMPLEMENTATION

INTRODUCTION

As noted in the article above, LDTI introduces potential modeling challenges while also being highly impactful from an accounting and process perspective. Prophet's inherent transparency and flexibility, coupled with its LTDI readiness, represent opportunities for companies to get a head start on LTDI analyses and implementation. Companies can either extend existing Prophet liability models or use externally projected liability ("EPL") cash flows to leverage Prophet's LDTI capabilities.

In this article, we overview a range of key changes introduced by FIS to support the transition to LDTI modeling in Prophet. These features are currently available and will be frequently updated in the US 360 product, with periodic feature snapshots taken for the non-US 360 offering, as summarized in Exhibit 1.

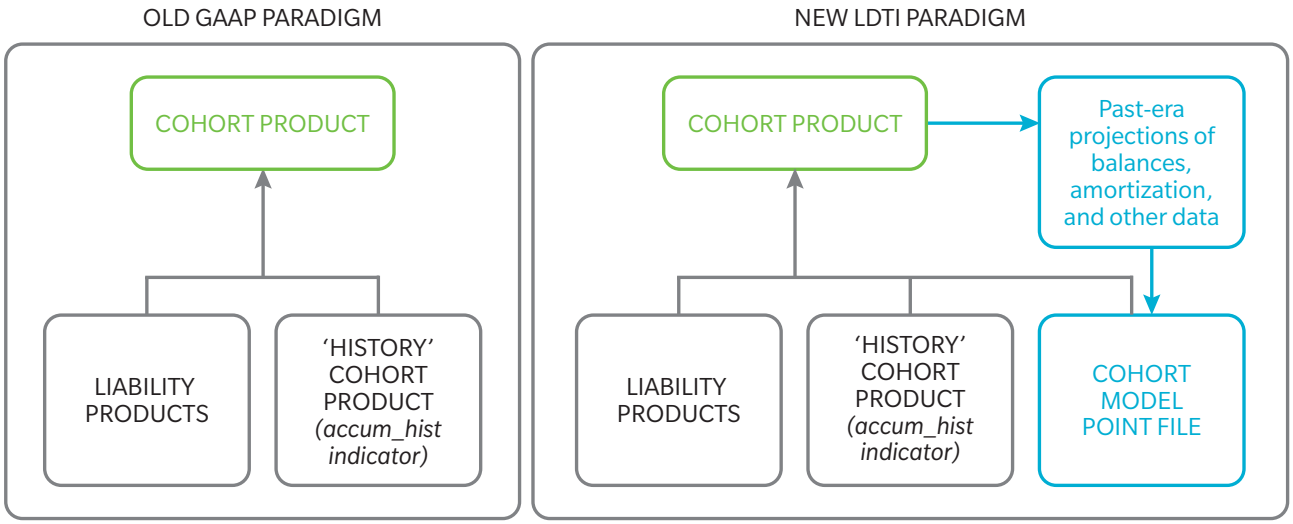
Exhibit 1: LDTI functionality availability

LIBRARIES	LDTI FUNCTIONALITY AVAILABILITY	UPDATE PERIODICITY
US 360 Life & Annuity US 360 GAAP Cohort	Already available	Frequent
US Life & Annuity US GAAP Cohort	Q3 2019	Periodic

LDTI MODEL DESIGN

As with pre-LDTI Prophet GAAP modeling, multiple Prophet cohort products are used alongside liability products to perform cohort-level GAAP calculations. The main change in structural design to support LDTI is the introduction of Prophet model point files to the cohort product. Exhibit 2 illustrates these design changes.

Exhibit 2: LDTI-related changes to the Prophet GAAP framework



WHAT'S NEW IN PROPHET

Prophet Control Centre

Companies using Prophet can formalize and automate their current business processes using FIS's Prophet Control Centre ("PCC"). PCC represents an end-to-end model automation and process governance tool that supplements the existing Prophet suite. PCC allows for a combination of automated, manual and control processes to manage company-specific workflow tasks, such as populating admin system data, generating inputs, and executing jobs.

Automated processes make use of various Prophet APIs to perform routine work whenever recognizable triggers, such as the completion of a prior step or reaching a specific date and time, are activated. Manual or control processes such as data approval and rejection are also embedded in the workflow steps to ensure the entire end-to-end modeling process is comprehensive and well documented.

The ability to automate routine tasks shrinks the time and cost of producing actuarial results and reduces operational risk. In addition, PCC's defined list of workflow steps produces a clear and traceable modeling procedure, useful in supporting internal and external audits of model processes and results.

COHORT ALIGNMENT

GAAP cohort products have traditionally utilized the 'cohorts' dimension and GAAP_COHORT_NUMBER variable to administer the passing of cohort-level information. The use of arrays supporting the 'cohorts' dimension was the mechanism used to repeat calculations across variables for each cohort.

However, disclosure requirements under LDTI necessitate the comparison of historical projections of cohort-level balances against the current projection to support the derivation of experience adjustments. Model point files, for reasons outlined below in Exhibit 3, are an effective tool to carry forward this cohort-specific information to the next reporting cycle.

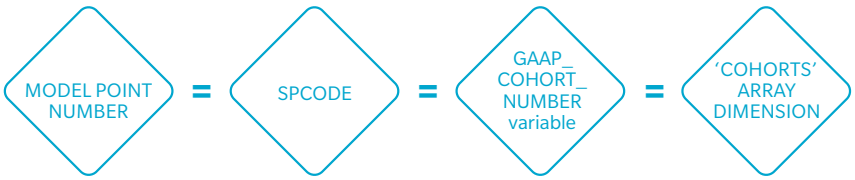
Exhibit 3: Cohort mechanisms

COHORT MECHANISM	PURPOSE
Model point number	• Allows for a range of cohort-specific assumptions to be input with ease • Reduces the number of array variables by leveraging the model point iteration mechanic • Can be automatically generated (discussed further below)
SPCODE	• Used to store cohort-level results by model point[1]
GAAP_COHORT_NUMBER	• Used as an index – for Prophet variables in calculations and table reads – to read from variables arrayed by 'cohorts'
'cohorts' array dimension	• Used to transfer cohort-level data from nested structures products • Traditional cohorting mechanism; facilitates code shareability with non-LDTI offering

1. Prophet does not store policy-level results for every model point by default. Because each cohort product model point represents a different GAAP cohort, it is necessary to use a unique SPCODE for each cohort in order to output results by cohort.

It is important to keep the cohort number aligned across the various mechanisms, as illustrated in Exhibit 4.

Exhibit 4: Alignment of cohort mechanisms



Z_SAMPLE_COHORT.rpt Preview

	1	2	3	4
1	SPCODE	GAAP_COHORT_NUMBER	GAAP_INIT_PRIOR_AMORT_BASIS	GAAP_INIT_PRIOR_DAC
2	1	1	23424.2	47070.9
3	2	2	25431.3	52540.3
4	3	3	26283.1	77495.2
5	4	4	29143.2	84402.4

Core — GAAP_PRIOR_AMORT_BASIS_PROJ_STORE — ZM53
Formula — Current Val Date DAC Amort Basis Projected at Prior Val Date Stored

```
1  IF t >= GAAP_AMORT_T OR cohorts <> GAAP_COHORT_NUMBER THEN
2    0
3  ELSE IF (NESTED_RUN = 1 AND NESTED_DEPTH = 1) OR NESTED_RUN = 0 THEN
4    GAAP_AMORT_BASIS(t)
5  ELSE IF t = CURR_DYN_START_T + CURR_DYN_PER OR CURR_DYN_START_T + DYNAMIC_PERIOD(level_
6    RNS_ALIAS("GAAP_TI_STRUCTURE_LINK", scenario_list.GaapTI, "GAAP_PRIOR_AMORT_BASIS_PRC
7  ELSE
8    0
```

GENERATING MODEL POINT FILES

To support LDTI disclosure, prior period expectations of DAC balances, amortization amounts, amortization bases, and a range of other key fields are required as of the projection date.

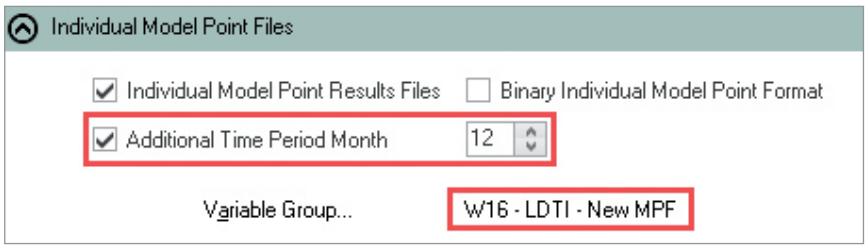
Producing this information is a matter of:

- Performing a Prophet run to project GAAP balances as of the prior reporting period
- Extracting certain run output balances as of the current reporting period for every cohort, and saving these results
- Making this data available as an input to the current period GAAP run

Through the use of cohort model point files, the above process can be automated in a single step.

This is achieved through Prophet run settings, which may be configured to produce model point file results. These model point output files, which take the form of PRODUCT.***t***.RPT, are generated based on variable values from the model run, specifically the values ***t*** months into the projection. This process automatically produces inputs for the next valuation cycle with no additional user effort. Exhibit 5 shows the key run settings features supporting this process.

Exhibit 5: Generating model point results



Use variable groups to select which variables are output to the generated model point files that will serve as inputs for the next valuation cycle.

INCORPORATING EPLS INTO PROPHET LDTI MODELS

The Prophet US GAAP Cohort Library has traditionally maintained optionality to be used with liability cash flows either generated within Prophet or read from EPLs.

The Prophet LDTI solution inherits this functionality, providing flexibility to companies that do not use Prophet for all modeling functions but have selected it as an LDTI solution. Exhibit 6 contrasts the Prophet LDTI framework with and without EPLs.

"As long as cash flows can be mapped against familiar Prophet variables, output from any projection model can be integrated into Prophet's LDTI solution."

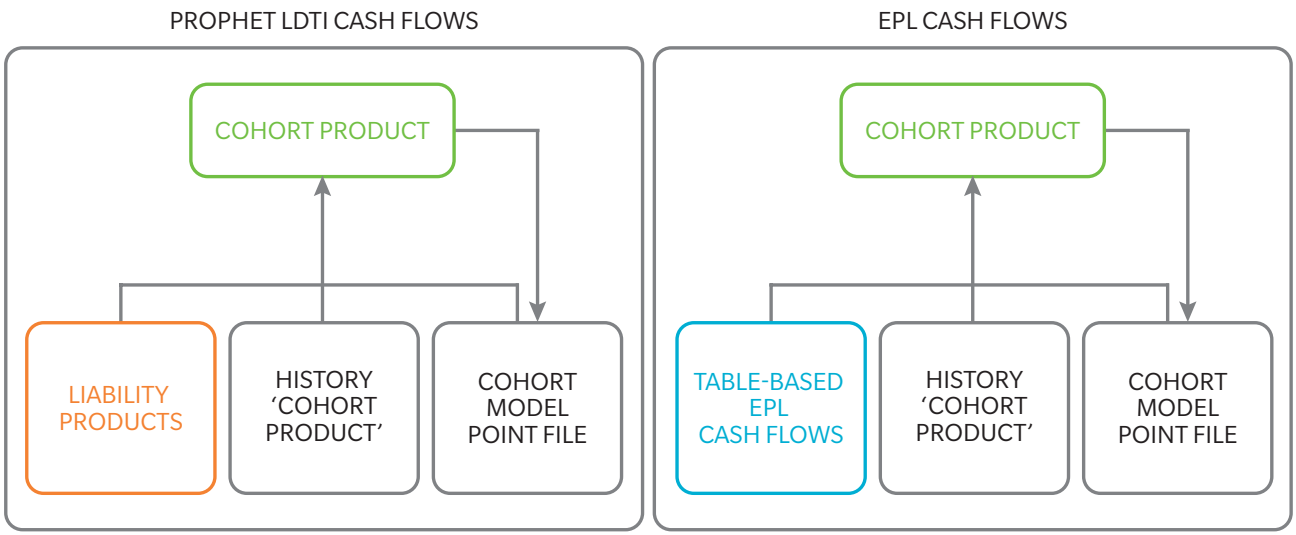
Key indicators and variables for EPLs

US 360 GAAP COHORT

KEY INDICATORS
EXTER_PROJ_LIAB

KEY VARIABLES
GAAP_CF_PROJECTED_TBL

Exhibit 6: EPL integration within the Prophet GAAP framework



By enabling the EXTER_PROJ_LIAB indicator, a cohort product can be converted from using Prophet results to instead read projected cash flows from a Prophet table. As long as cash flows can be mapped against familiar Prophet variables, output from any projection model can be integrated into Prophet's LDTI solution.

RESERVE CALCULATIONS

GAAP reserving for traditional contracts (such as whole life, term, life-contingent payout annuities and long-term care) utilizing a net level premium valuation approach will change under LDTI. Key LDTI changes include:

- Reserve calculations are performed at a cohort level
- No provisions for adverse deviation
- Net premiums are capped at gross premiums, eliminating the need for loss recognition on these products
- Discounting is performed under upper-medium grade yields, i.e., discount rates no longer reflect the company's own portfolio yields
- Assumptions are unlocked based on new experience data as it emerges

Cohort-level calculations and discount rates are addressed in additional detail below.

Key indicators and variables for reserve calculations

US 360 LIFE & ANNUITY

KEY INDICATORS

GAAP_RES

KEY VARIABLES

GAAP_TARG_IMP_LEGACY_FLAG
GAAP_BASE_RES_LINK

US 360 GAAP COHORT

KEY INDICATORS

US_GAAP_TARG_IMP_TRAD

KEY VARIABLES

GAAP_BRES_Z
GAAP_BRES_ORIGINAL_Z
GAAP_BENEFIT_K
GAAP_BENEFIT_K_NUMER/DENOM
GAAP_CHG_PRES_OCI_Z

COHORT-LEVEL CALCULATIONS

Under the LDTI framework, benefit reserves are calculated at the cohort level. Prophet supports this by moving benefit reserve calculations into the cohort product rather than performing policy level calculations in the liability product.

Instead of generating policy level reserves as before, the liability product is responsible only for passing key liability cash flows such as death, maturity, and surrender benefits to the cohort product. The net level premium factor used by the cohort product is called the "GAAP Benefit Reserve K-Factor" (GAAP_BENEFIT_K).

DISCOUNT RATE CURVE

Benefit reserves need to be calculated twice, once using the current yield curve and once using the yield curve as of the issue date. This is necessary to satisfy the LDTI requirement to quantify the impact of the difference between those two rates under Other Comprehensive Income ("OCI") reporting.

Prophet conducts benefit reserve valuation under both sets of upper-medium grade yields simultaneously within a single run, attributing the impact through GAAP reporting variables and recognizing the impact in OCI.

Key implementation considerations

- Policy-level GAAP benefit reserves can be enabled within an LDTI run. The GAAP_TARG_IMP_LEGACY_FLAG switch is used within the liability product to suppress policy-level benefit reserve calculations done within the GAAP_BASE_RES_LINK module link. This is an input variable that can save runtime when the cohort product is used for benefit reserve calculations, but can also be changed
- Prophet caps the net level premium ratio at 100%; however, output variables do not currently capture the excess of net premium over gross premium out-of-the-box

DAC AMORTIZATION

DAC amortization calculations are significantly simplified under LDTI. Complicated retrospective adjustments, amortization bases that vary by product type, discounting, "shadow" adjustments, different assumption sets, and loss recognition testing are all eliminated. From a modeling perspective, the key changes are that:

- A straight-line amortization approach is used for all long duration products, eliminating variation in amortization bases across different product lines
- DAC calculations are performed at an individual policy level or grouped basis (cohort level)
- When assumptions are unlocked, amortization rates are adjusted prospectively by pivoting off the beginning of period balance

Other balances such as sales inducement assets and unearned revenue liabilities on universal life type contracts will transition to using a straight-line amortization approach consistent with DAC.

Prophet supports both individual policy-level and cohort-level amortization out-of-the-box. If cohort-level amortization is used, different cohort basis options exist: e.g., policy count, face amount, units in force, account value, etc.

Key indicators and variables for DAC amortization

US 360 LIFE & ANNUITY

KEY INDICATORS

GAAP_RES

KEY VARIABLES

GAAP_DAC_SERIATIM_AMORT
GAAP_AMORT_PERIODS
GAAP_AMORT_BASIS
GAAP_AMORT_TYPE
GAAP_xxx_SERIATIM_AMORT

US 360 GAAP COHORT

KEY INDICATORS

US_GAAP_TARG_IMP

KEY VARIABLES

GAAP_AMORT_TYPE
GAAP_AMORT_BASIS
GAAP_DAC_AMORT
GAAP_AMORT_MODULE_FLAG

MODIFYING DAC CALCULATIONS

The GAAP_AMORT_TYPE variable is used to govern DAC calculation behavior across the liability and cohort products, with its different supported options governed by the eGAAP_AMORT_TYPE enumeration. Exhibit 7 summarizes how the liability and cohort products behave under different GAAP_AMORT_TYPE values.

Exhibit 7: GAAP_AMORT_TYPE outcomes

DAC CALCULATION GRANULARITY	GAAP_AMORT_TYPE VALUE	LIABILITY PRODUCT	COHORT PRODUCT
Policy level	eGAAP_AMORT_TYPE.Seriatim	• Policy-level DAC calculations are enabled	• DAC results are read from the liability product • The DAC calculation module is turned off to save runtime. i.e., cohort-level accumulation and calculations are disabled
Cohort level	eGAAP_AMORT_TYPE. DeathBen eGAAP_AMORT_TYPE.PolCount eGAAP_AMORT_TYPE.Fund eGAAP_AMORT_TYPE.Units	• Policy-level DAC calculations are disabled • The generically named 'amortization basis' is set to the selected basis	• The generically named GAAP amortization basis is read from the liability product for each cohort • The DAC calculation module is turned on. i.e., cohort-level accumulation and calculations are enabled

EXPERIENCE ADJUSTMENTS

LDTI requires that experience adjustments on DAC balances (i.e., the impact of changing projected actuarial assumptions) be separately reported. The Prophet LDTI solution calculates and presents the experience adjustment explicitly within the cohort product.

All of the prior period cohort-level balances, amortization basis, and capitalized amounts needed to support the experience adjustment calculation are supplied by cohort-level model point files. These files are created automatically through the process described earlier in the article.

Key implementation considerations

- The ability to seamlessly toggle between potential amortization bases is very beneficial when attempting to determine the optimal amortization basis for given cohorts
- Prophet's straight-line DAC amortization does not consider decrements. This may require customization depending on company-specific interpretation of the standard

MARKET RISK BENEFIT MODELING

LDTI introduces uniformity with respect to accounting for guarantees associated with account balance based contracts. Any feature that protects the contract holder against more than nominal capital market risk is measured at fair value.

While GAAP fair value is not a new concept, LTDI applies them across more product types than before. For MRB modeling, VA contracts with GMIB, GMAB, GMWB, and GMDB riders and FIA contracts with GMWB and GMDB riders are currently supported in Prophet.

LINKAGE TO EXISTING PRODUCTS

The modeling of MRBs is consistent with FAS133 modeling pre-LDTI, where GMxB_COST_COHORT and GMxB_OUTGO_COHORT variables are used to capture fees and benefit payments in excess of account value, respectively.

This design allows existing Prophet products to be easily extended for MRB valuation, requiring only that rider-specific fees and benefit payments be determined. The linkage process is illustrated in Exhibit 8.

Key indicators and variables for MRBs

US 360 LIFE & ANNUITY

KEY INDICATORS

GAAP_RES_LDTI

KEY VARIABLES

GAAP_EXCESS_BEN_TYPE
GMxB_COST_COHORT
GMxB_OUTGO_COHORT
MRB_VNP_COHORT(cohorts, mrb_types)
MRB_COHORT(cohorts, mrb_types)

US 360 GAAP COHORT

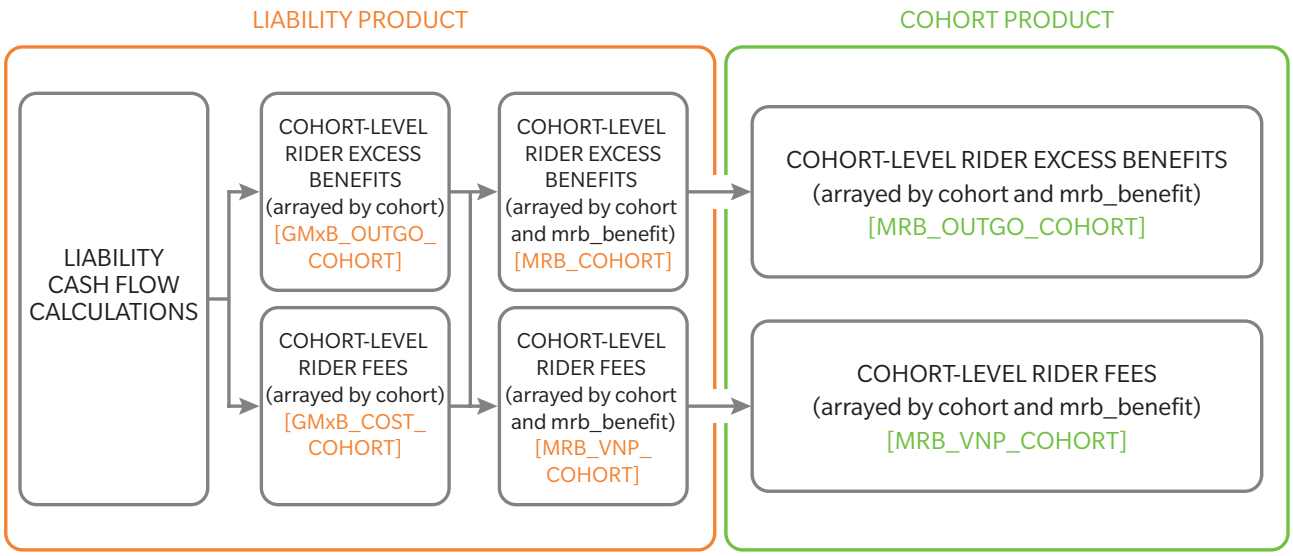
KEY INDICATORS

US_GAAP_TARG_IMP_NONTRAD
USG_MRB

KEY VARIABLES

MRB_AVG_CALC
MRB_RES_Z

Exhibit 8: MRB data transfer

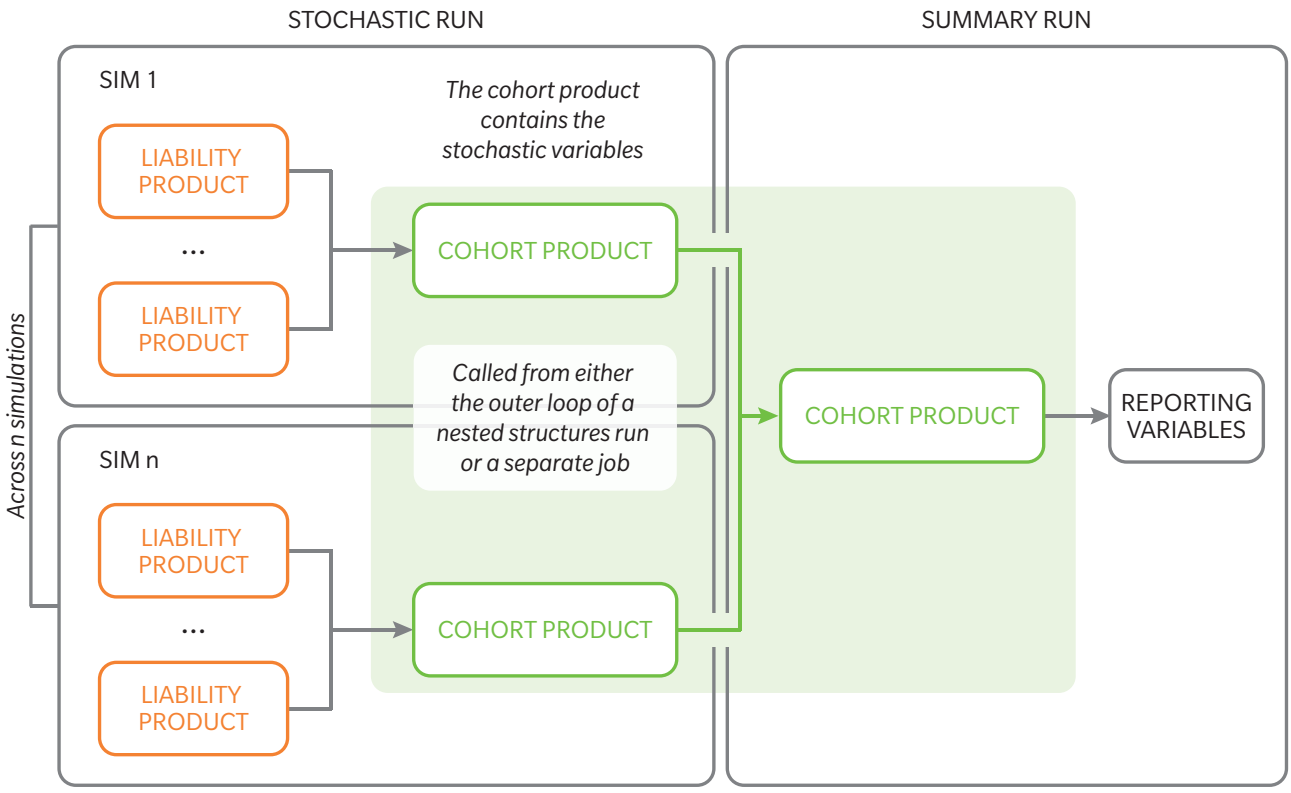


INTEGRATION OF STOCHASTIC MODELS

The calculations illustrated above perform policy-level valuation of MRBs, but only for a single simulation. To account for MRBs under a fair value methodology, the cash flows and present values attributable to each MRB need to be determined across a suitable range of stochastic scenarios. The average of the stochastic cohort-level excess benefits and fees can then be accumulated by a summary run. This relationship is visually depicted in Exhibit 9 below, with the following options available to execute the summary run:

- **Option 1 – Standalone run:** One stochastic Prophet run is used to generate results and another Prophet run is used to summarize the final MRB valuation. This method requires the use of a control file to link the two Prophet jobs (i.e., runs) and facilitates MRB valuation for a single point in time only.
- **Option 2 – Nested structures run:** The inner loop runs represent the stochastic projections and the outer loop run comprises the summary run. The use of nested structures further allows MRB valuation to occur at future periods within the projection.

Exhibit 9: Stochastic run structure



QUANTIFYING CREDIT RISK

Under LDTI, changes to the fair value of MRBs due to instrument-specific credit risk in a liability position are reported through OCI. This requires the specific impact of period-over-period credit spread changes to be quantified separately.

Prophet calculates two sets of MRB reserves within a single run: one under each of prior period and current period credit spreads. The attribution of the difference to OCI and GAAP income is done without any reliance on external or multi-run processes.

Key implementation considerations

- Wrapping the MRB valuation process within a nested structures run is generally a more preferable solution. The out-of-the-box Prophet LDTI offering is constructed to recognize when the LDTI solution is used in a nested structures context, and to automatically align the transfer of information between the outer and inner loop runs at the product level
- The use of nested structures for stochastic MRB calculations bypasses the need to execute multiple Prophet jobs and parameterize run control tables, whether for time-zero valuation or re-valuation at future projection points
- Prophet supports the option-based approach of fair value measurement. The attributed fee methodology is currently not explicitly supported

WHAT'S NEW IN PROPHET

Nested structures

Beginning with Prophet 9.x, FIS introduced nested structures functionality that allows Prophet jobs to be embedded within other Prophet jobs. This functionality is key in supporting several reserving and solvency processes that require separate outer loop and (typically stochastic) inner loop calculations, such as forecasting PBR reserves. The functionality is granted through a generic and flexible chassis that gives users the freedom to suit their specific needs.

Modern Prophet library solutions take full advantage of the nested structures functionality. Products automatically recognize whether they are being used in a standalone run, as the outer product in a nested structures run, or as the inner product in a nested structures run. This allows a single product the flexibility to be used across all three instances. In addition, it allows nested structures to be used in combining point-in-time calculations which previously required multiple Prophet runs to generate results.

FIS continues to build on the capabilities of its nested structures feature. Beginning with its release of Prophet version 9.0.4, FIS introduced the capability for structure links to have different projection frequencies, providing flexibility in determining the frequency of running inner loop scenarios. This feature can significantly reduce model runtime.

CONCLUSION

Prophet users benefit from significant out-of-the-box LDTI functionality that can be flexibly expanded to suit individual company needs and interpretations of ASU2018-12. While LDTI represents one of the most impactful emerging standards, insurers can gain comfort that in the midst of significant operational, accounting, and IT challenges, Prophet provides a robust LDTI modeling solution.

TIPS & TRICKS

Flexible tables

Prophet flexible tables are similar in structure to traditional generic tables but allow different table designs to be read from a single READ_FLEXIBLE_TABLE statement, significantly enhancing code reusability.

Generic tables require read functions to precisely provide every single index in the table-defined order. Flexible tables, on the other hand, can glean index information in three ways:

1. Implicit indices

- Allows "contextual information" to be read automatically if they are needed for a table index
- These indices do not need to be included in the READ_FLEXIBLE_TABLE statement
- Table indices that match data from model point, parameter, global, constant, PROD_NAME, and VAR_NAME variable definitions will be interpreted automatically
- Implicit indices cannot be time dependent

Example: A flexible table has expenses by AGE_AT_ENTRY and SEX, information that is available within the model point file. The read function can be READ_FLEXIBLE_TABLE("expenses.flx", Number) without requiring any indices at all, as that information will be gleaned automatically from the model point file.

2. Explicit indices

- The name of the index used in the READ_FLEXIBLE_TABLE statement must match the corresponding index in the flexible table's index heading
- These indices must be included in the READ_FLEXIBLE_TABLE statement
- This can be used for standard variables, local variables (inside extended formulae), PROD_NAME, and VAR_NAME
- Order does not matter, and the user may specify more explicit indices than necessary

Example: A flexible table has base lapse data by AGE_AT_ENTRY and POLICY_YEAR. The read function can be READ_FLEXIBLE_TABLE("base_lapse.flx", Number, POLICY_YEAR(t), SMOKER_STAT), where the POLICY_YEAR variable is used to read against the POLICY_YEAR index, without consideration to order. The SMOKER_STAT index is simply ignored, as it does not exist in the table and thus does not need to be considered.

3. Mapped explicit indices

- Similar to explicit indices, but allows the modeler to map a different variable for the index lookup

Example: A flexible table contains a SMOKER_STAT index but the modeler wants to use the SMOKER2_STAT variable to perform the lookup instead. The READ_FLEXIBLE_TABLE statement can perform this mapping by using the following syntax: SMOKER2_STAT -> "SMOKER_STAT"

ABOUT OLIVER WYMAN

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