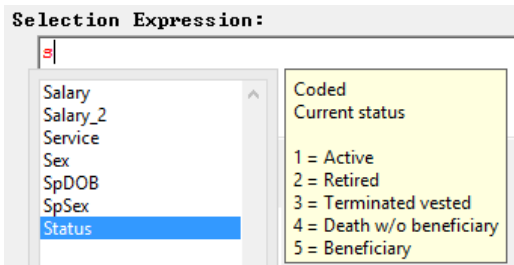


ProVal version 3.07 is a landmark release which introduces a richer expression interface, flexibility for modeling COLAs, new forecasting capabilities, and many other new features.

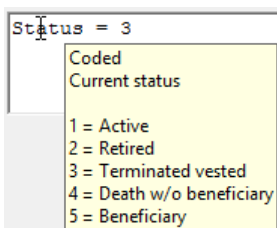
Expressions

Entering an expression in ProVal – whether a selection expression or benefit formula – has been transformed by a collection of new features. AutoComplete, syntax coloring, and parenthesis bolding help you with the syntax so you can focus on the logic. Double-click-to-edit and term tooltips bring the details closer to the surface, making ProVal feel flatter.

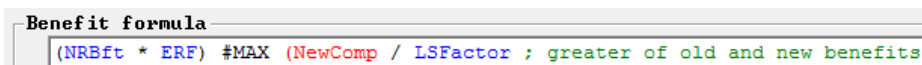
- ◆ **AutoComplete.** As you type an expression, ProVal displays a list of valid operators and fields (or components) that match what you've typed so far. To help you pick the right one, a brief description is shown for the selected item in the list, including codes and labels for coded fields. You can insert the selected item into the expression by pressing Enter or Tab. You may never use F1 again!



- ◆ **Term tooltips.** As you hover your mouse over a term, a tooltip will show the same brief description that appears during AutoComplete. This is a great way to review someone else's work or to quickly check what "Status = 3" means.



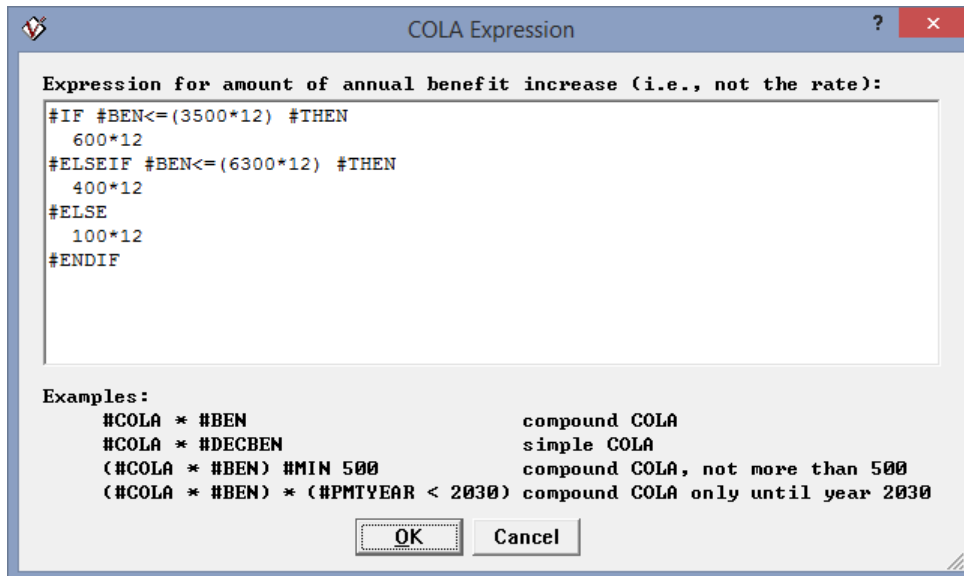
- ◆ **Syntax coloring.** To help you see syntax errors as you type, unknown terms and unbalanced parentheses appear in red. Editable terms appear in blue (see double-click-to-edit below) and comments appear in green.



- ◆ **Double-click-to-edit.** In benefit formulas and accrual basis formulas, you can double-click on a blue component to edit it (e.g., NRBft in the formula above) or double-click on a red component to create a new one (e.g., NewComp the formula above). This works for custom operators too!
- ◆ **Parenthesis bolding.** When you type a closing parenthesis or position the cursor next to any parenthesis, the matching pair are temporarily highlighted in bold.

COLAs

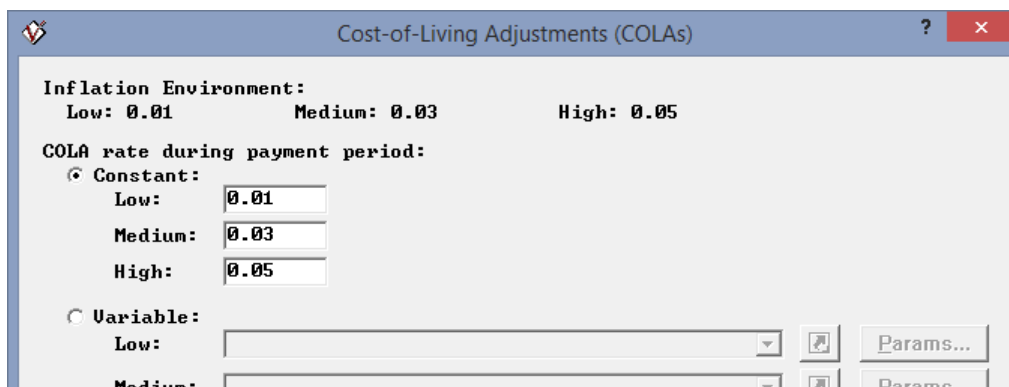
- ◆ **COLA expressions** let you specify virtually any pattern of benefit increases. A COLA expression (e.g., “#COLA * #BEN”) defines the annual amount of increase in the benefit, generally using the operator #BEN to refer to the previous year’s benefit and the operator #COLA to refer to the rate of increase. It opens the door to all kinds of complex COLAs that couldn’t be valued exactly before, like this COLA that steps up the benefit in increments of 600, 400, or 100 depending on how large the benefit already is:



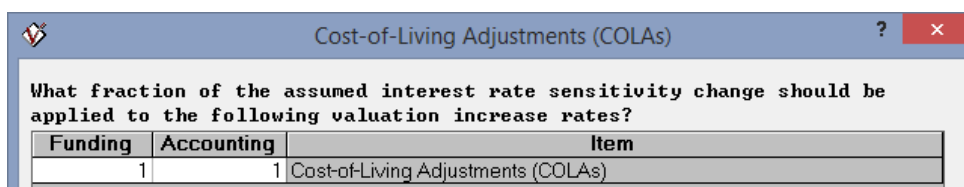
COLA expressions are specified in Valuation Assumptions by selecting a rate type of Advanced (as opposed to Compound or Simple).

For more, see [COLA Expressions](#) on page 16.

- ◆ **Experience COLAs** (or experience RPI and CPI in U.K. Pension mode) can now vary with inflation in a core projection – and differ from valuation COLAs. This allows you to explicitly model complex experience COLAs. You no longer need to estimate the impact using “additional COLAs” in deterministic and stochastic assumptions.



- ◆ **Valuation assumption sensitivities.** Valuation COLAs can now vary with valuation interest rates in a core projection. Previously, it wasn’t possible to vary the COLA assumption in a forecast.



- ◆ **COLA timing.** ProVal can now explicitly recognize COLA increases that happen mid-year. If COLA increases occur other than at end of year, ProVal will value an average benefit during the year. For example, if the COLA rate is 10%, current benefit is 1,000, and first increase occurs 3 months after the valuation date, then the average benefit in the first year is 1,075 $[(1,000*0.25)+(1,000*1.1*0.75)]$, in the second year is 1,182.5 $[(1,000*1.1*0.25)+(1,000*(1.1^2)*0.75)]$, etc.

COLA increases occur annually:

at end of year

at constant date: (mm/dd)

at month and day from database field:

Forecasting

- ◆ **Forecast events.** You can now specify future events in a forecast, much like you do in a Valuation Set. For example, you can reflect a change in valuation mortality 2 years from now. Simply point to a Core Projection using current valuation mortality for the initial 2 years, set up an event that points to another Core Projection using the new valuation mortality for later years, and tell ProVal what year the event takes place. Starting in the year of the event, liabilities will switch to the "event" Core Projections. ProVal amortizes the change in liability as a gain or loss. There is no limit to the number of events that you can define.

Deterministic Forecast - [new]

Name:

Included Core Projections:

Name	Val Date	Modified	Size
Current val mortality	1/01/2015	1/08/2015 10:53 AM	1

Buttons: Add/Omit, Overrides, Add Event

Future (Gain)/Loss Events:

- ◆ **Cash balance crediting rates that vary with an asset benchmark.** Crediting rates, input in projection assumptions, may now optionally move with an asset class (such as the 30 year treasury yields) rather than being tied to inflation.

CashBal -

Asset Benchmark:
Low: 0.02 Medium: 0.04 High: 0.06

Crediting Rate:
 Constant:
Low:
Medium:
High:

Variable (from library):
Low:
Medium:
High:

Variable:

Vary based on:

Buttons: Clear, OK, Cancel

For more, see [Forecasting enhancements for plans with account-balance benefits](#) on page 24.

- ◆ **Active population growth by group** lets you specify different growth patterns for different segments of the population. For example, suppose Tiers 1 and 2 are closed to new entrants, but you want total growth in Tiers 3 + 4 to be 1%, 2%, 3%, then level:

Active Population Growth

Population growth increase rates:

From	To	Group 1	Group 2
-	2015	-1	0.01
2016	2016	-1	0.02
2017	2017	-1	0.03
2018	-	-1	0.00

Vary by group using coded database field: **Tier**

Database Code	Group
Tier 1 (closed)	1
Tier 2 (closed)	1
Tier 3	2
Tier 4	2

OK Cancel

- ◆ **New entrant profiles by entry year.** The example below hires new entrants into Tier 3 through 2017 and Tier 4 thereafter. The new entrant database contains two sets of records, one with Tier=3 and another with Tier=4. Note that after 2018 the Tier 3 group becomes closed to new entrants, but the total population growth for Tier 3 + 4 could be separately set level so that any decrements from Tiers 3 and 4 are replaced with Tier 4 new entrants (see previous bullet).

Selection Expression:

Static

By entry year (change profile over time)

From	To	Selection Expression
-	2017	tier = 3
2018	-	tier = 4

OK Cancel

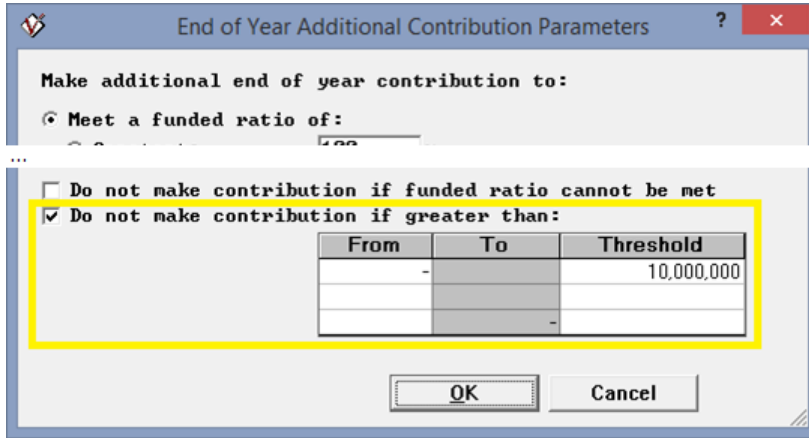
- ◆ **New entrant data defaults.** Data defaults (specified in Census Specifications) can now be applied to new entrant databases. For example, if you are using data defaults to specify different plan variations for different cores (such as alternative accrual rates), you no longer have to establish a separate new entrant database for each variation.

New Entrant Specification

Database File: **NE08**

Use data defaults

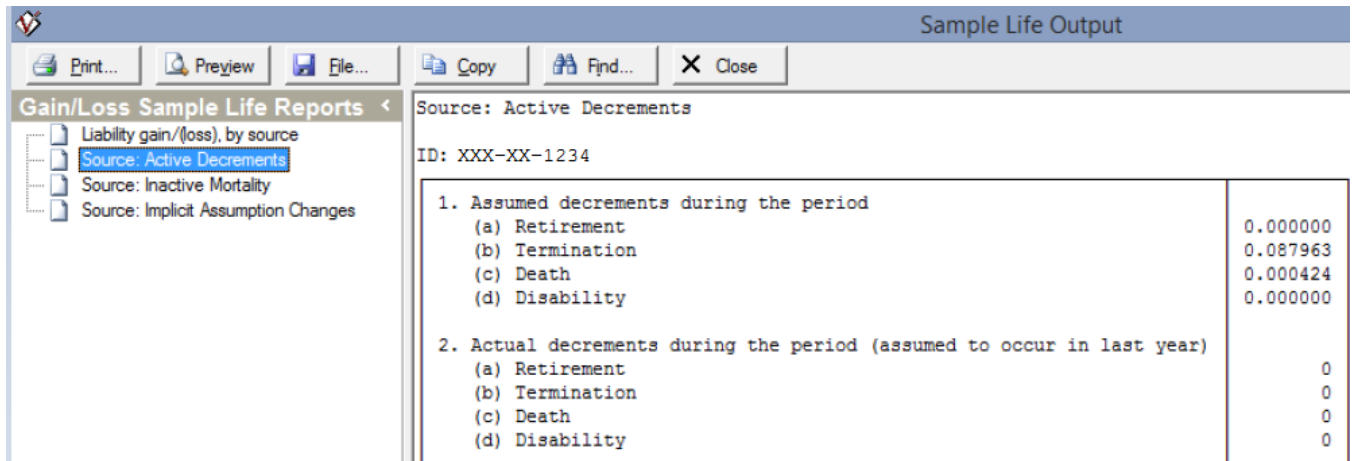
- ◆ A new threshold amount lets you skip the end of year additional contribution if it's too large (e.g., don't make contribution if above 10 million).



- ◆ Stochastic Assumptions now have an option to switch PPA assumptions from segment rates to a yield curve at some point during the forecast.
- ◆ A new Technical Reference help article documents the mathematical model ProVal uses to develop treasury and corporate yield curves and associated investment returns.

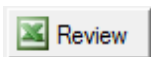
Gain/Loss Analysis

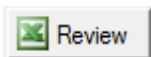
- ◆ **Gain/loss sample lives** detail the calculation of each gain/loss source for a given record. These reports focus on the cause of each source rather than reproducing liability calculations.



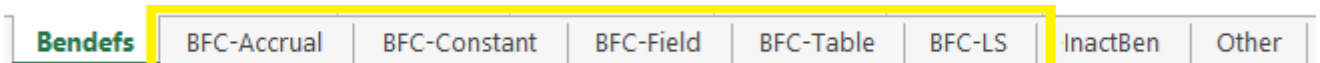
- ◆ The expected value for continuing actives' data fields can now be determined from any component, not just cash balance and career average components.

Benefits Review

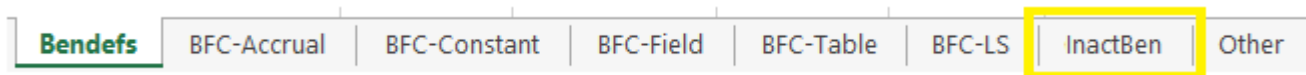


The popular  feature has been expanded and refined.

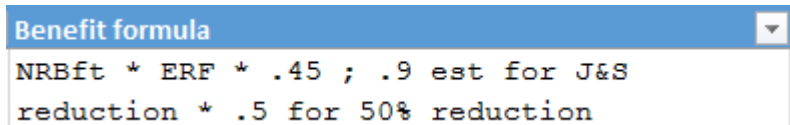
- ◆ **Component review.** Benefit formula components and accrual basis components have been moved onto their own sheets (by type) so you can review them in the same tabular format as benefits.



- ◆ **Inactive benefit review.** When viewing inputs to a valuation or core projection, inactive benefits have been moved onto their own sheet so you can review them in the same tabular format as active benefits. In addition, the Review button is available when viewing Census Specifications directly.



- ◆ The format of expressions has been improved so they look more like they do in ProVal.



Mortality Tables

- ◆ **SOA RP-2014 mortality tables and MP-2014 mortality improvement scale** have been added to ProVal's mortality library.

Mortality Rates Library	
Name	Modified
SOA RP-2014 Blue Collar Mortality with Scale MP-2014	11/13/2014 3:34 AM
SOA RP-2014 Disabled Retiree Mortality with Scale MP-2014	9/26/2014 8:50 AM
SOA RP-2014 Total Dataset Mortality with Scale MP-2014	9/26/2014 8:50 AM
SOA RP-2014 White Collar Mortality with Scale MP-2014	11/13/2014 3:34 AM
SOA RPH-2014 Blue Collar Headcount-weighted Mortality with Scale MP-2014	1/07/2015 9:49 AM
SOA RPH-2014 Disabled Retiree Headcount-weighted Mortality with Scale MP-2014	1/07/2015 9:49 AM
SOA RPH-2014 Total Dataset Headcount-weighted Mortality with Scale MP-2014	1/07/2015 9:49 AM
SOA RPH-2014 White Collar Headcount-weighted Mortality with Scale MP-2014	1/07/2015 9:49 AM

- ◆ **CIA CPM-2014 mortality tables and CPM-B improvement scale** have been added to ProVal's mortality library. Mortality rate linkage parameters have been enhanced to allow size adjustment factors to be coded directly into the mortality table.

Mortality Rates Library	
Name	Modified
CIA CPM-2014 Combined Mortality (base rates only)	9/26/2014 8:50 AM
CIA CPM-2014 Combined Mortality with CIA Scale CPM-B	9/26/2014 8:50 AM
CIA CPM-2014 Private Sector Mortality (base rates only)	9/26/2014 8:50 AM
CIA CPM-2014 Private Sector Mortality with CIA Scale CPM-B	9/26/2014 8:50 AM
CIA CPM-2014 Public Sector Mortality (base rates only)	9/26/2014 8:50 AM
CIA CPM-2014 Public Sector Mortality with CIA Scale CPM-B	9/26/2014 8:50 AM

- ◆ **IRS 2008+ Applicable Mortality Table for 417(e), 0 Pre-Comm (dynamic)** mortality has been added to ProVal's mortality library for those plans that use applicable lump sum mortality but assume none pre-commencement.

Mortality Rates Library	
Name	Modified
IRS 2008+ Applicable Mortality Table for 417(e), 0 Pre-Comm (dynamic)	11/03/2014 9:44 AM

- ◆ **Easier sorting of tables.** For clarity and ease of sorting, all of ProVal's built-in mortality tables have been renamed to begin with a three-letter prefix indicating their source of origin: CIA for the Canadian Institute of Actuaries, SOA for the Society of Actuaries or IRS for the Internal Revenue Service.

Employee Contributions for Pension Plans

- ◆ **Simple entry for simple contributions.** There's now an easy way to enter simple employee contributions, e.g., "0.02 * #SALARY", instead of requiring a career average component. Also,

employee contributions have moved into their own library rather than being included in the benefit definition library.

- ◆ **Automatic refund of employee contributions.** Now you can just check a box to value a refund of employee contributions instead of setting up separate benefits. Experience crediting rates can be tied to inflation or an asset benchmark.
- ◆ **Automatic split of normal cost.** The employee and employer portions of normal cost are now available simply by checking the box "Display employer/employee normal cost split." Previously the split was only available by checking "display by decrement," which could have resulted in an excess amount of detail.
- ◆ A new scaling factor lets you scale the employee contribution offset to normal costs separately from the employer normal cost.
- ◆ For more, see [Employee Contributions \(for pension plans\)](#) on page 17.

US Public Pension Plans

- ◆ **Extra decrements.** Decrements can now be specified by benefit; for example, ordinary vs. duty disability. No longer do you have to create a table of total decrement rates and associated post-decrement probability tables with the relative percentage. (Although inspired by US Public Pension Plans, this feature is available in all modes.)

Benefit Definition	Rate Table
Dis - Duty disability benefit	Duty disability rates
Dis - Non-duty disability benefit	Non-duty disability rates

Total disability decrement is the sum of unique tables applicable to the member.

Table service based on:

Field: <rounded attained age - rounded hire age>

Service Definition:

Plan filter: <No filter>

OK Cancel

- ◆ **Additional 415 maximum benefit options** are now available.
 - In Benefit Definitions (under the Apply 415(b) maximum benefit limit Adjustments button), plan early retirement reduction factors can now be entered so that ProVal can reduce the 415 limit by the greater of the IRS and plan reductions. (This feature is also available in U.S. Qualified mode.)

For more, see [Applying the 415\(b\) Limit](#) on page 22.
 - In Valuation Assumptions > Regulatory Data > U.S. Maximum Benefits, the following options, specifically designed for U.S. public plans, are available:
 - For death and disability benefits, you can turn off the reduction for pre-62 commencement. You can also turn off the service proration if less than 10 years.
 - You can turn off the reduction for pre-62 commencement if 15 years of participation service. This is useful if valuing benefits for police, firefighters, or US armed forces.

- The default for the 3-year salary limitation is set to “not applicable” in U.S. Public mode (existing option).

U.S. 415(b) Maximum Benefit Limit

Dollar limitation

Interest rate before age 62: 0.05
after age 65: 0.05

Mortality table:
IRS 2008+ Applicable Mortality Table for 417(e) (dynamic)

Apply mortality discount in actuarial reductions & increases
 Apply actuarial increases after age 65
 Do not reduce for death or disability benefits before age 62
 Do not reduce before age 62 if 15 years of participation service

Payment frequency for actuarial reduction & increase factors:
 Annual (beginning of year)
 Plan's benefit payment frequency and timing

Participation service based on:
 Field: <date of hire>
 Service Definition:

Highest 3-year average salary limitation

Valuation salary (from Census Specifications)
 Alternative salary
 Not applicable

Small benefit limitation

Apply \$10,000 exemption
 Do not prorate limitations for service of less than 10 years for death and disability benefits

OK Cancel

- ◆ **Contribution lag period.** You can now lag the application of the contribution policy one or two years, either by carrying forward a percentage of payroll or a dollar amount with interest.

Contribution Policy

Actuarial Cost Method: Projected Unit Credit (PUC)

Apply Full Funding Limit

Contribution Policy:
Normal Cost + Supplemental Cost Add'l Params...

Apply lag period Parameter

Limit contribution to

Additional Contribution: 0

Fraction of year from Valuation to end of Plan Year to average date contributions are made: 0.5

Contribution Lag parameters

Lag Contribution Policy for: One year Two years

Based on:
 Percentage of valuation payroll
First year: 5 %
Second year: %
 Calculated dollar amount (with interest):
First year:
Second year:

OK Cancel

- ◆ For the Funding Period calculation (an option with the “percentage of payroll” contribution policy), ProVal now includes the popular payroll frequency of “bi-weekly” (26 payments).
- ◆ In the normal cost exhibit, the backed-into contribution percentage is now displayed on a valuation salary basis (in addition to total salary).

US Qualified Pension Plans

- ◆ PBGC increases as prescribed by the 2014 Multiemployer Pension Reform Act are supported.
- ◆ For PPA plans with a contribution schedule, a new “Development of Expected Return on Contributions” exhibit develops the calculation of interest on expected contributions used in Pension Expense.
- ◆ For PPA plans with an “N-Year Average” asset method that spreads excess returns, the expected return can now be based on the lesser of the 3rd segment rate and the expected rate (instead of just using the 3rd segment rate).

N-Year Average

Years in Averaging Period: 3

Year	Asset Gain (Loss)
	-2
	-1

Asset Gain/(Loss) to be Spread:
Excess return over expected return

Expected Return Based on Prior Year
Assets: Market Value
Return: **Min. 3rd Segment & Expected Rate**

Current year rate: 0.068
Expected rate: **0.08**

- ◆ For PPA plans, Deterministic Assumptions can now optionally calculate Funding rates based on the Max Tax rates so you don’t have to calculate them yourself and type them in.

Future Valuation Interest Rates

Enter a yield curve assumption or specify values below:

Max Tax liability <rate changes specified below>

Calculate Funding rates based on Max Tax rates (reflecting MAP-21)
 Reflect HATFA corridors beginning in: 2013 2014

Funding liability <rate changes specified below>

PBGC liability* <rate changes specified below>

Actuarial liability* <rates specified below>

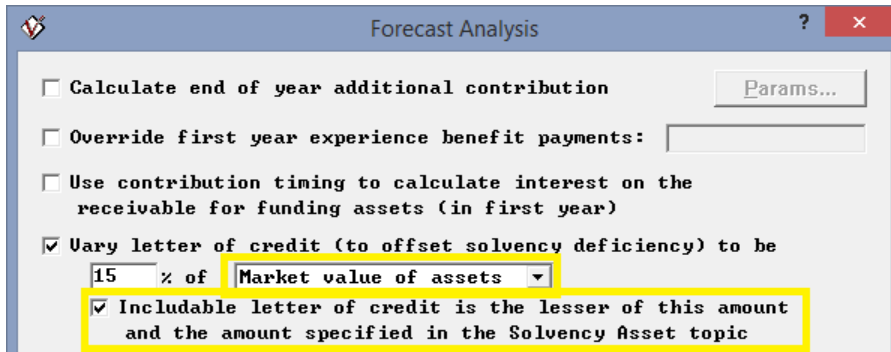
Accounting liability <rates specified below>

(leaving a column blank references its valuation assumption)

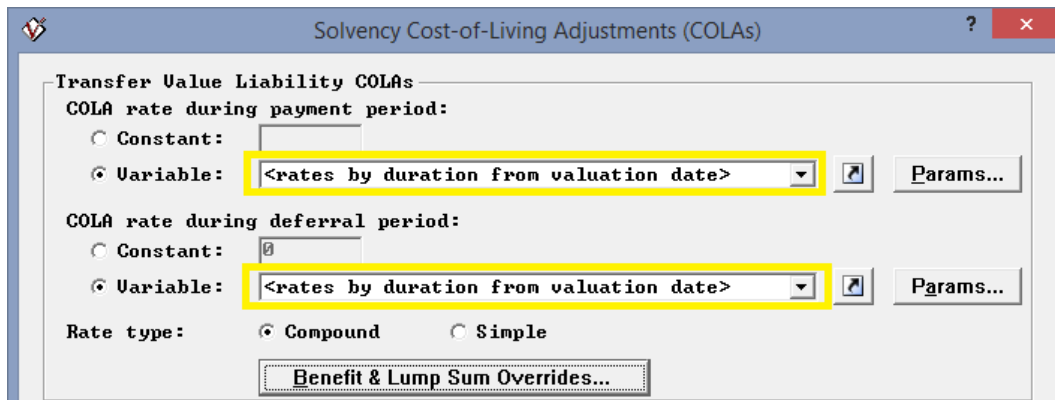
Yea	Change in Funding Rates	Change in Max Tax Rates	Change in PBGC Rates *	Actuarial Liability Rate *	Acctg Discount Rate	Acctg Expected Return
1						

Canadian Registered Pension Plans

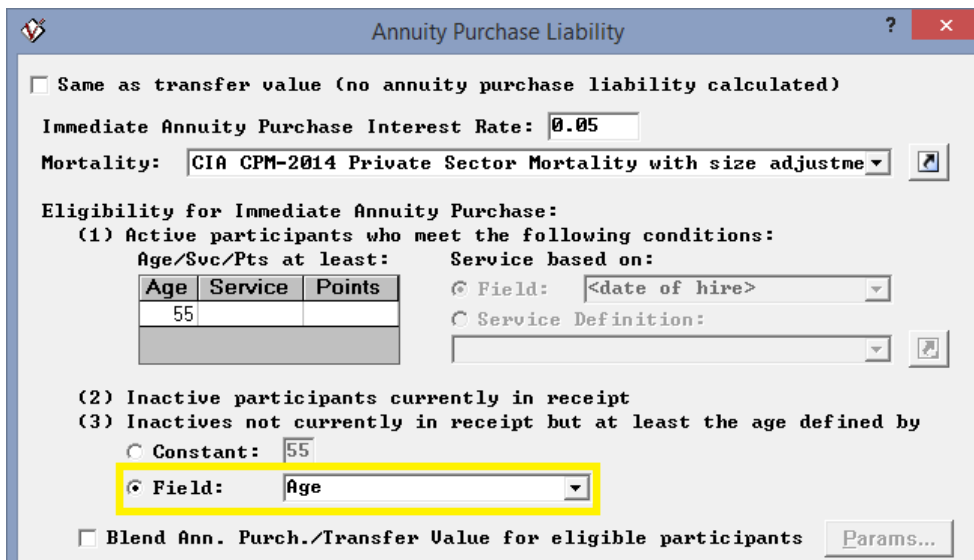
- ◆ The maximum letter of credit can now be based on the market value of assets (previously, it could only be tied to the solvency liability) to accommodate plans which are federally regulated. In addition, you can further limit the letter of credit to a fixed dollar amount.



- ◆ For the Transfer Value liability, COLAs can now vary by duration from the valuation date. This is useful in a forecast when valuing a mixture of non-indexed, fully indexed, and/or partially indexed benefits as the structure of the COLA rates can now match the structure of the transfer value interest rates for future valuation dates.



- ◆ For the Immediate Annuity Purchase liability, the age criteria for inactives can now reference a field instead of the same constant age for all inactives.



- ◆ Solvency cash flows are now available in the output with splits by annuity purchase and transfer value.

All Plans

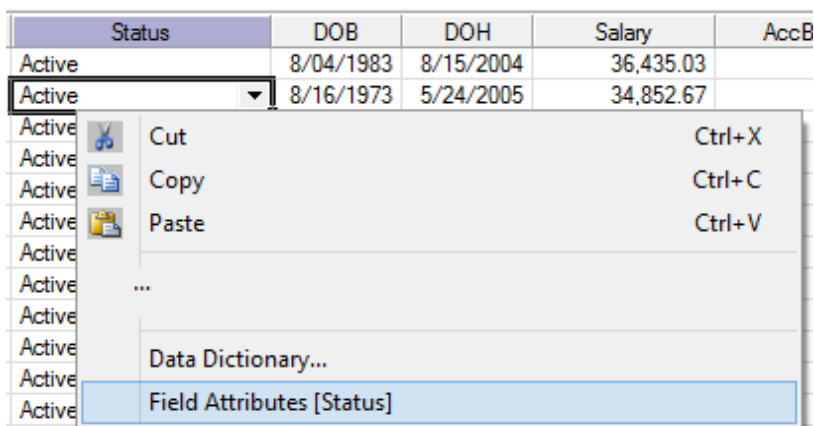
- ◆ The calculation of projected benefit payments (cash flows) under a middle of year decrement assumption has been modified so that they exactly sum to the liability at 0% interest. This will generally result in only a small change to the cash flows, but could be significant where a short

payment period (such as 2 years) is used for temporary or certain-only active benefits (see ProVal's changes log for details). The revised calculation also makes runs about 1.15 times faster on average.

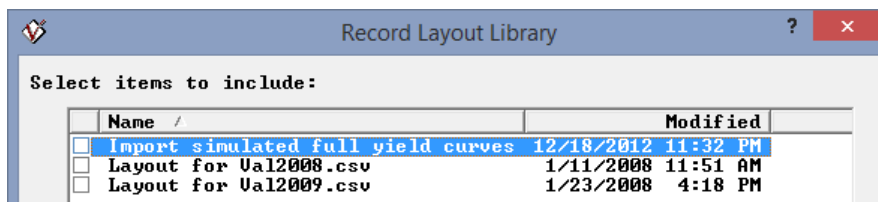
- ◆ In valuation assumptions, a fractional participation service requirement through negative 1 (e.g., -0.5) is now allowed for determining when participants are included in liabilities.
- ◆ The valuation set event formerly known as "Accounting Methodology Change" was renamed to "Accounting Expected Return on Assets Change" to clarify its purpose.

Census Data

- ◆ Moving through the data with Ctrl+arrow key (which moves to the edge of the current data region) has been significantly sped up. For example, moving 250,000 rows down used to take over 6 minutes and now takes less than 10 seconds.
- ◆ In spreadsheet edit, right-clicking and selecting "Field Attributes" gives you a quick shortcut to the Data Dictionary entry for the selected field. This is particularly useful for accessing codes and labels for coded fields.



- ◆ When comparing databases, you can now compare a subset of records by specifying selection expressions.
- ◆ In the data import wizard, the selection of a record layout now includes checkboxes to make it obvious that a record layout has not been initially selected.



Also, the suggested record layout name for Excel-sourced data now includes the sheet name (e.g., "Record layout for mydata.xls [Sheet1]") making it harder to accidentally overwrite the record layout for a different sheet.

- ◆ The compare button is now available in Define Field by Table and Define Field by Expression. In addition, the output generated when comparing Expression Sets has been improved.

Output & Reporting

- ◆ In Valuation Output, you can now view the sum of numeric fields from the input database (after data defaults are applied) alongside valuation results, even reflecting any subtotals. This is useful for checking that the correct input data (salaries, account balances, service amounts, etc.) was used.

Variables	valuation 2013	valuation 2013: Sex= Male	valuation 2013: Sex= Female
B.O.Y. EBO	89,407,215	59,112,918	30,294,297
B.O.Y. PBO	40,694,759	27,209,117	13,485,643
B.O.Y. ABO	28,375,553	19,474,794	8,900,759
Sum of: AccBen	746,857.31	379,763.60	367,093.71
Sum of: Salary	39,339,506.07	25,326,383.82	14,013,122.25

- ◆ In Valuation Output, the +/- interest rate sensitivity percentage is listed in the input summary.

PPA Funding Interest Rate	Segment rates (0.0494, 0.0615, 0.0676)
PPA Max Tax Interest Rate	Segment rates (0.0162, 0.044, 0.0545)
Actuarial Liab. Int. Rate	0.07
Funding Interest Sensitivity	+/- 0.01
Funding Salary Scale	0.035 + merit scale
PPA PBGC Interest Rate	Segment rates (0.0162, 0.044, 0.0545)
Accounting Run Date	December 22, 2014 1:04 PM
Accounting Run Version	3.07 Dec 18, 2014
Accounting Assumptions	Accounting 2013
Accounting Interest Rate	0.055
Accounting Interest Sensitivity	+/- 0.01
Accounting Salary Scale	0.03 + merit scale
ABO Discount Rate	0.055

System & Interface

- ◆ ProVal's help is now browser-based and hosted online for more reliable access (as compared with local .chm files which were increasingly blocked by security updates). Furthermore, the content has been reformatted with a modern font for better readability.

Winklevoss Technologies
Help & Support Center

Home > Command Reference > Input Menu > Valuation Assumptions

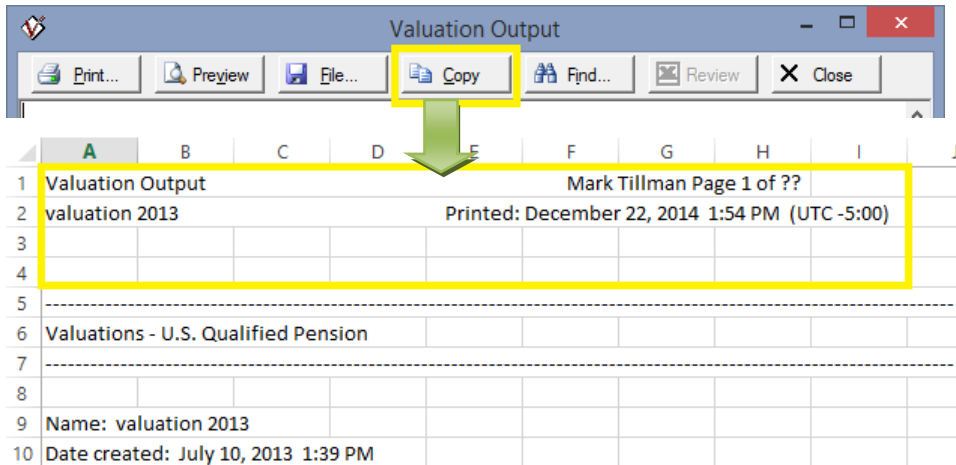
Valuation Assumptions

Valuation Assumptions are divided into two types: funding and accounting. In the German pension mode, funding assumptions are referred to as "tax/funding". Use funding assumptions to generate liabilities and normal costs for determining contributions to the plan, including Teilwert liability in German mode; use accounting assumptions to generate liabilities and normal costs to determine accounting expense, except to determine GASB expense in the OPEB and U.S. public

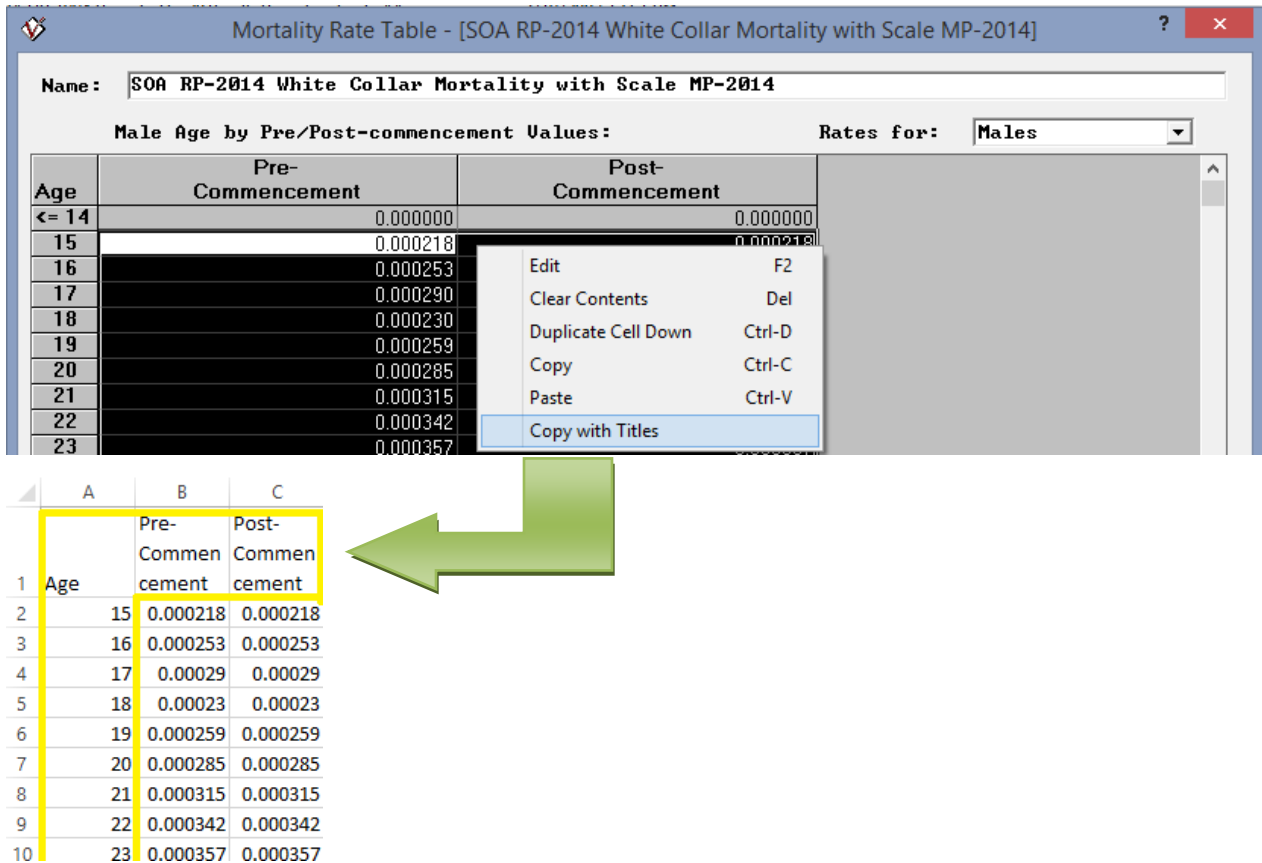
- ◆ For add/omit screens (e.g. valuations in a Valuation Set, Core Projections in a deterministic forecast, benefits in a plan), ProVal now displays all of the library's columns (F, A, name, valuation date, etc.) and lets you sort by them to make it easier to pick the right entries in the list.

	Name	Val Date	Modified	Size
<input checked="" type="checkbox"/>	F A valuation 2014	1/01/2014	7/10/2013 2:25 PM	544 KB
<input type="checkbox"/>	F A valuation 2013	1/01/2013	12/22/2014 1:04 PM	247 KB

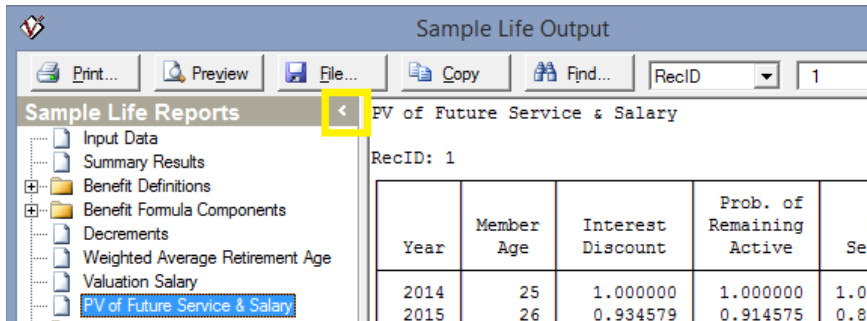
- ◆ When using the Copy button to paste output into Excel, the user/timestamp header info is now included for better documentation. This also makes using the Copy button equivalent to using the File button.



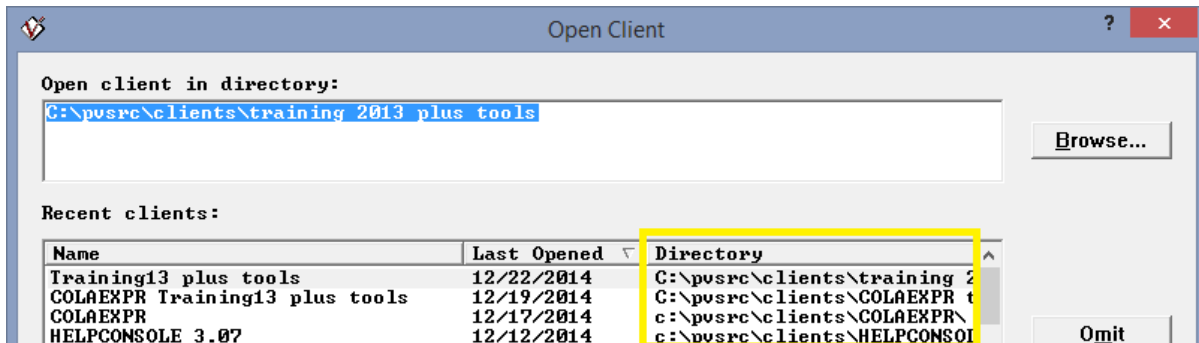
- ◆ In tables (and other inputs presented in a grid such as yield curves), a new "Copy with titles" right-click option lets you include the row and column headings on the clipboard. This saves you from having to label the data after pasting.



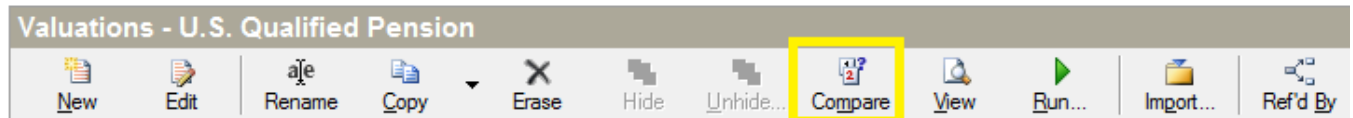
- ◆ In sample lives, you can hide the tree list to maximize the room available for displaying the report.



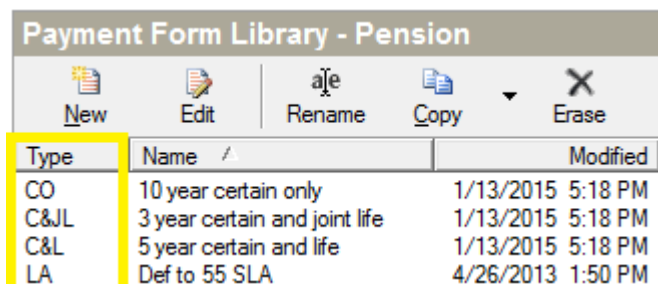
- ◆ The client path is now included in Open Client and Update Clients to help distinguish between clients with the same name.



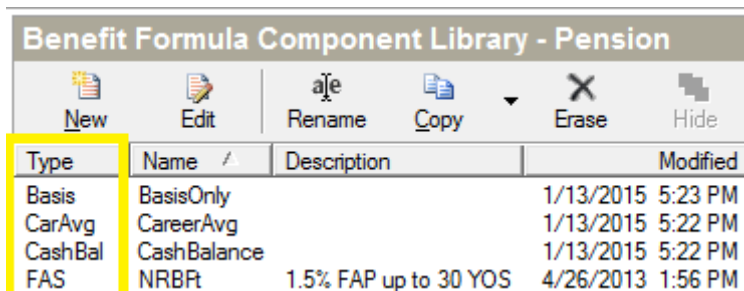
- ◆ You can now compare up to 62 items, up from the previous limit of 10.



- ◆ The payment form library now displays a Type column.



- ◆ The Type column displayed in the benefit formula component library now distinguishes between types of Accrual Definitions



- ◆ A time zone issue has been resolved that prevented you from viewing valuation results run by a user in a time zone ahead of you until your clock catches up to theirs at the time of the run.

- ◆ The FILE FULL limit of 4 GB is now harder to hit because ProVal compresses results for valuations, valuation sets, core projections, and deterministic forecasts run in 3.07. Below is an example of a valuation that took 544 KB of space in 3.06 but only 72 KB in 3.07:

	Name	Val Date	Modified	Size
F A	valuation 2014, 3.07	1/01/2014	12/22/2014 2:30 PM	72 KB
F A	valuation 2014, 3.06	1/01/2014	7/10/2013 2:25 PM	544 KB

In addition, a size column has been added to run libraries to make it easier for you to see which runs are big.

- ◆ The user-specific settings stored in pvcom.sf have been moved to proval.ini. Proval.ini is now the single source for user-specific settings. Existing pvcom.sf files can be deleted after running version 3.07 for the first time.

Administration Factors

- ◆ Payment Forms can now specify variable COLA rates.

Batch Server

- ◆ In Batch Execution > Server Status, the Active Job Status now includes the elapsed time and time remaining (in addition to the percent complete).

ProVal API

- ◆ The registration of proval.exe and provalps.exe has been made independent, making it possible to operate the ProVal API, ProVal PS, and/or the ProVal PS API on the same machine.

ProVal PS API

- ◆ The roll forward calculations have been expanded in U.S. Qualified Pension mode to include the PPA at-risk liability and benefit payments. Also, the roll forward calculator is now available in all modes, not just U.S. Qualified Pension.
- ◆ When assumptions are specified for synthetics, the credit balance roll forward now includes the return on the synthetics.
- ◆ The new API calls GetDetAssum, SetDetAssum, and GetDetAssumDoc let you manipulate Deterministic Assumptions through the API, e.g., to change the end of year asset value override for budgeting.

Changes Log

- ◆ Be sure to read the changes log (see "changes log.doc" in the ProVal folder) about updates to certain calculations that may change results.

New member of the WinTech team

We are pleased to introduce **Molly Thompson** who recently joined our team. She is an experienced ProVal user and will be answering ProVal support questions, testing new features and versions, booting up studies as part of our back office service, and much more. Please say hello to her if you reach her at ProVal support.



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COLA Expressions

ProVal 3.07 introduces the new concept of a COLA Expression. With the use of these expressions, COLA patterns more general and complex than just “simple” and “compound” can finally be modeled, and some previously impossible benefit patterns can now be programmed with ease and flexibility.

Advanced COLAs



Rate type:
 Compound
 Simple
 Advanced

Under the Cost-of-Living Adjustments (COLAs) topic of Valuation Assumptions, the previous choice to select whether the COLAs are Compound or Simple has now been expanded with a third option: Advanced. Upon selecting this option, a button to input the Expression becomes accessible, where you can enter a COLA Expression to define the pattern of benefit changes after decrement from active service (i.e., during deferral and payment periods).

Expressions and Examples

Note that a COLA Expression defines the annual *amount* of benefit increase, not the percentage or rate change. For example, a flat dollar COLA of \$200 increase per year would use simply “200” for its expression.

Operators are available to customize the effects of these COLA Expressions. The most useful of these operators are the following:

- **#COLA** refers to the COLA rate (e.g., 0.02) as specified in valuation or projection assumptions. This can include COLA rates that vary by calendar year or coded field.
- **#BEN** refers to the benefit amount in the prior payment (or deferral) year, including accumulated COLAs to date.

Perhaps the most intuitive COLA would be an adjustment that multiplies each year’s COLA rate by the benefit amount in the prior payment (or deferral) year, most commonly known as a Compound COLA. While this can be modeled using ProVal’s option to declare the rate type as “Compound,” it can also be modeled using a COLA Expression:

#COLA * #BEN ; this is a compound COLA

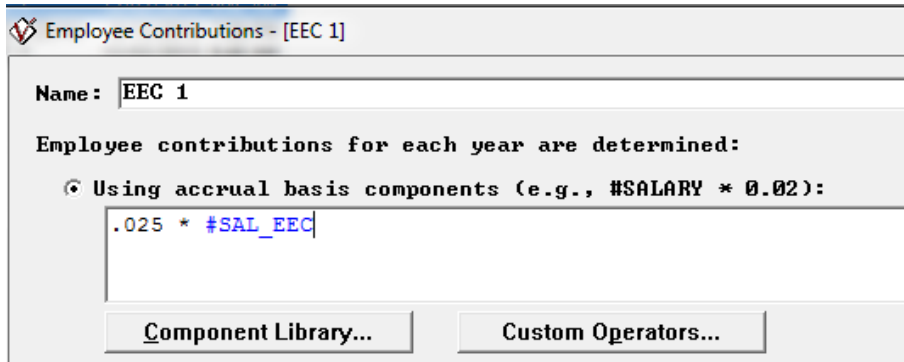
For more information about other COLA operators and example of their uses, consult the ProVal Help article [COLA Expression Operators](#).

Employee Contributions (for pension plans)

ProVal now handles employee contributions in a simpler, more intuitive way. Employee contributions are no longer coded in the Benefit Definition library – they have moved into their own library and have new capabilities.

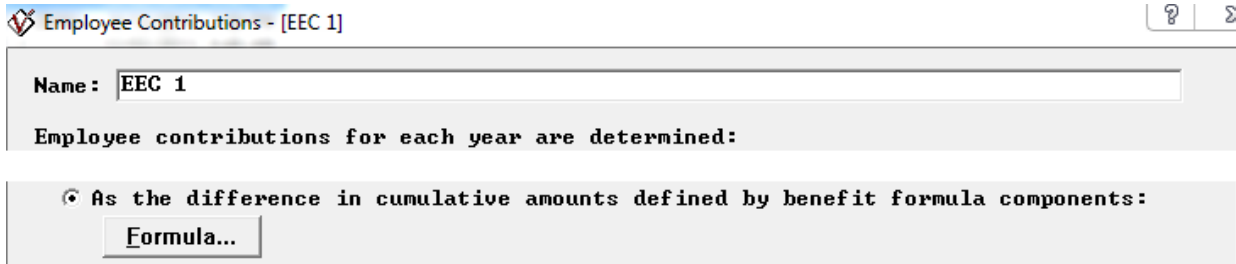
Coding Employee Contributions

ProVal 3.07 introduces simplified formula coding that allows you to express contributions in a direct manner such as a percent of pay multiplied by salary. Contribution formulas may now use accrual basis components and custom operators. The example below shows a formula that is 2.5% of a custom salary operator:



The screenshot shows a window titled "Employee Contributions - [EEC 1]". The "Name" field is set to "EEC 1". Below this, the text "Employee contributions for each year are determined:" is followed by a radio button selected for "Using accrual basis components (e.g., #SALARY * 0.02):". A text input field contains the formula ".025 * #SAL_EEC". At the bottom, there are two buttons: "Component Library..." and "Custom Operators...".

Previously, it was necessary to create a benefit component that was an accrual definition with a career average format because ProVal determined the annual contribution as the difference in accumulated benefit. When ProVal updates your client to 3.07, any existing employee contributions in your 3.06 client will be updated to continue using this method – see image below. To access the formula defining the employee contributions under this method, click on the "Formula..." button.



The screenshot shows a window titled "Employee Contributions - [EEC 1]". The "Name" field is set to "EEC 1". Below this, the text "Employee contributions for each year are determined:" is followed by a radio button selected for "As the difference in cumulative amounts defined by benefit formula components:". A button labeled "Formula..." is visible below the radio button.

It should be noted that, under the entry age normal liability method, there are some potentially material differences between the two methods of entering employee contributions. The difference occurs in the calculation of employee contributions for years prior to the valuation year. When using accrual basis components, employee contributions prior to the valuation date are always determined using a backwards projection of the formula specified. If employee contributions are specified as the difference in cumulative amounts defined by benefit formula components where the benefit formula component referenced is a career average accrual definition, the parameterization of the accrued benefit topic of that benefit formula component will have an effect. If the accrued benefit is defined as zero, the historical contributions will be 0. If the accrued benefit is defined to be a database field containing the employee contributions as of the valuation date, the historical contributions will be normalized so that, when accumulated, they will be equal to the balance on the valuation date. If the accrued benefit is defined as the expected value, the employee contributions prior to the valuation date will simply reflect the accrual rates applied to historical salaries (i.e., if the accrual patterns are the same, this will produce the same results as using accrual basis components).

Automatic refunds of employee contributions

ProVal now provides an option to pay a refund of employee contributions whenever a participant decrements ineligible for any other plan benefit. Eligibility for a refund of contributions is determined separately for each decrement. For example, assume a plan pays disability and termination benefits after 5 years of service, a death benefit to married participants after 3 years of service, and a death benefit to single participants after 5 years of service. If the new automatic refund option is elected, and a participant becomes disabled or terminates prior to attaining 5 years of service, a refund of contributions will be paid. If a participant dies prior to attaining 3 years of service then a refund of contributions will also be paid. If a participant dies with at least 3 years of service but less than 5 years, a refund will be paid only to the single participants (because the married participants are eligible for a plan death benefit).

Automatic refunds are internally parameterized to use the following assumptions (for which alternatives exist in ProVal if the refunds are instead parameterized manually):

- Always included in vested liabilities
- Assumed to be payable immediately as a lump sum
- Liabilities are calculated using linear attribution
- Interest and accruals are compounded annually

If you elect the option to pay automatic refunds, you must specify the value of employee contributions with interest as of the valuation date. You can select a database field from your data dictionary, <zero> (which may be appropriate for a new plan), or <expected value> (in which case ProVal will estimate the value).

Refund employee contributions when not eligible for any plan benefit
 Employee contributions accumulated with interest:

Valuation Assumptions > Increase & Crediting Rates (and Projection Assumptions > Increase & Crediting Rates) have been enhanced to include a new topic for Employee Contributions. This is where you specify the rate at which the employee contributions will be credited with interest. You can specify a different interest crediting rate for each employee contribution definition. A sample life report has been added that will allow you to readily check the projection of the accumulated contributions with interest.

Employee Contributions
 Contribution: Rfd - EEC with Refund

RecID: 1

Year	Age	Benefit Service	Valuation Salary	#SALARY Component	Annual Contribution	Interest Rate	Refund of Contributions
2015	26	0.000000	43,062.32	43,062.32	1,076.56	0.0500	0.00
2016	27	1.000000	45,906.59	45,906.59	1,147.66	0.0500	1,076.56
2017	28	2.000000	48,938.72	48,938.72	1,223.47	0.0500	2,278.05
2018	29	3.000000	52,171.12	52,171.12	1,304.28	0.0500	3,615.42
2019	30	4.000000	55,617.02	55,617.02	1,390.43	0.0500	5,100.47
2052	63	37.000000	258,376.64	258,376.64	6,459.42	0.0500	257,211.47
2053	64	38.000000	267,419.82	265,000.00	6,625.00	0.0500	276,531.45
2054	65	39.000000	276,779.52	265,000.00	6,625.00	0.0500	296,983.03

Formula based on: Accrual Basis Components
 Employee contribution formula = .025 * #SALARY
 Accumulated contributions = from database field: EECwI
 Employee contributions and interest are credited annually.

Selection Expression

ProVal now lets you apply a selection expression to employee contribution definitions making it easier to apply different definitions to different segments of the plan participants. See the section at the end of this article titled "Gain/Loss Calculations" for some considerations when using selection expressions, the automatic refund feature, and planning to run the gain/loss tool.

Scaling Factors

ProVal now lets you optionally specify a separate scaling factor for the employee contribution offset to normal cost. For example, in Funding Scaling Factors, you can either elect to use the same scaling factor applied to the employer normal cost associated with each liability method, or you can specify a new constant in which case the same factor is applied to the employee contribution offset of all liability methods.

Employee Contribution Offset to Normal Cost

Same as factor used for employer normal cost

Output

Automatic split of normal cost: ProVal now offers the option to split any normal cost in output between the employee and employer portions. This new option is found under the Details button when selecting output variables.

Output Detail

— Inactives —

Display by ProVal status code

— Actives —

No detail

Display by decrement

Display by selected benefits

- Eec - EEC with Refund
- Ret - Retirement UK
- Rfd - EEC with Refund
- Trm - Termination UK

Display total of selected benefits

Display employer/employee normal cost split

Display details for projected benefits

OK Cancel

If the new option is selected, the output will look like this:

Variables	1/1/2015 Valuation with EEC Refund
Projected Unit Credit Normal Cost	1,392,925
Projected Unit Credit Normal Cost (Employee Normal Cost)	-872,583
Projected Unit Credit Normal Cost (Total Normal Cost)	2,265,508

Sample lives: The summary of results sample life report has been enhanced to include the total employee contribution offset for each normal cost included in the report. This new section is only displayed if the Plan Definition includes at least one employee contribution definition.

Summary Results

	RecID: 1
Status	Active
Attained Age	26.41
Decrement age	
Hire age	26.41
Service from hire	0.00
Beneficiary age	
Current salary	43,062
Expected Benefit Obligation	47,914
PV of Employee Contributions	17,090
Actuarial Liabilities (all benefits)	
Projected Benefit Obligation	0
Accumulated Benefit Obligation	0
ASC 960	0
Vested Accumulated Benefit Obligation	0
Vested ASC 960	0
Actuarial Liability Normal Costs (all benefits)	
Projected Benefit Obligation	1,059
Accumulated Benefit Obligation	(147)
ASC 960	(147)
Employee Normal Costs	
Projected Benefit Obligation	(962)
Accumulated Benefit Obligation	(962)
ASC 960	(962)

There is also a new section in the sample lives called "Employee Contributions" that contains a report for each employee contribution definition as well as the report illustrated earlier for each automatic refund.

Output by Benefit or Decrement Detail: If you have any employee contributions with the automatic refund feature selected, when displaying liability results by benefit detail there will be a refund "benefit definition" for each employee contribution refund (this is in addition to the previously existing line item for each employee contribution definition). Similarly, if you display liability results by decrement all refund benefits have been grouped together into a new "decrement" called refund of employee contribs.

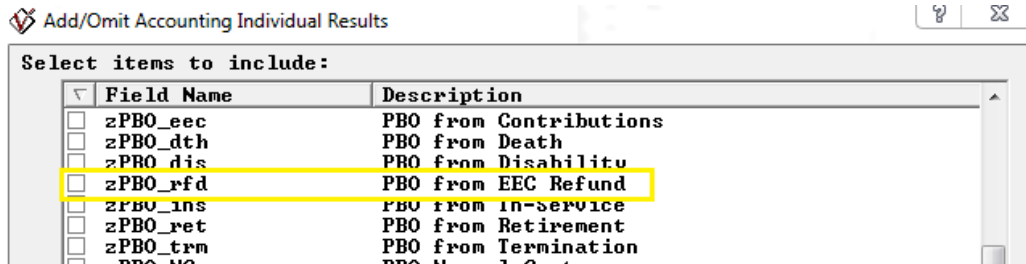
Detail by benefit

Variables	1/1/2015 Valuation with EEC Refund
B.O.Y. PBO (Active)	39,697,511
B.O.Y. PBO (Active) (Eec - EEC with Refund)	0
B.O.Y. PBO (Active) (Ret - Retirement)	37,577,513
B.O.Y. PBO (Active) (Rfd - EEC with Refund)	254,364
B.O.Y. PBO (Active) (Trm - Termination)	1,865,635

Detail by decrement

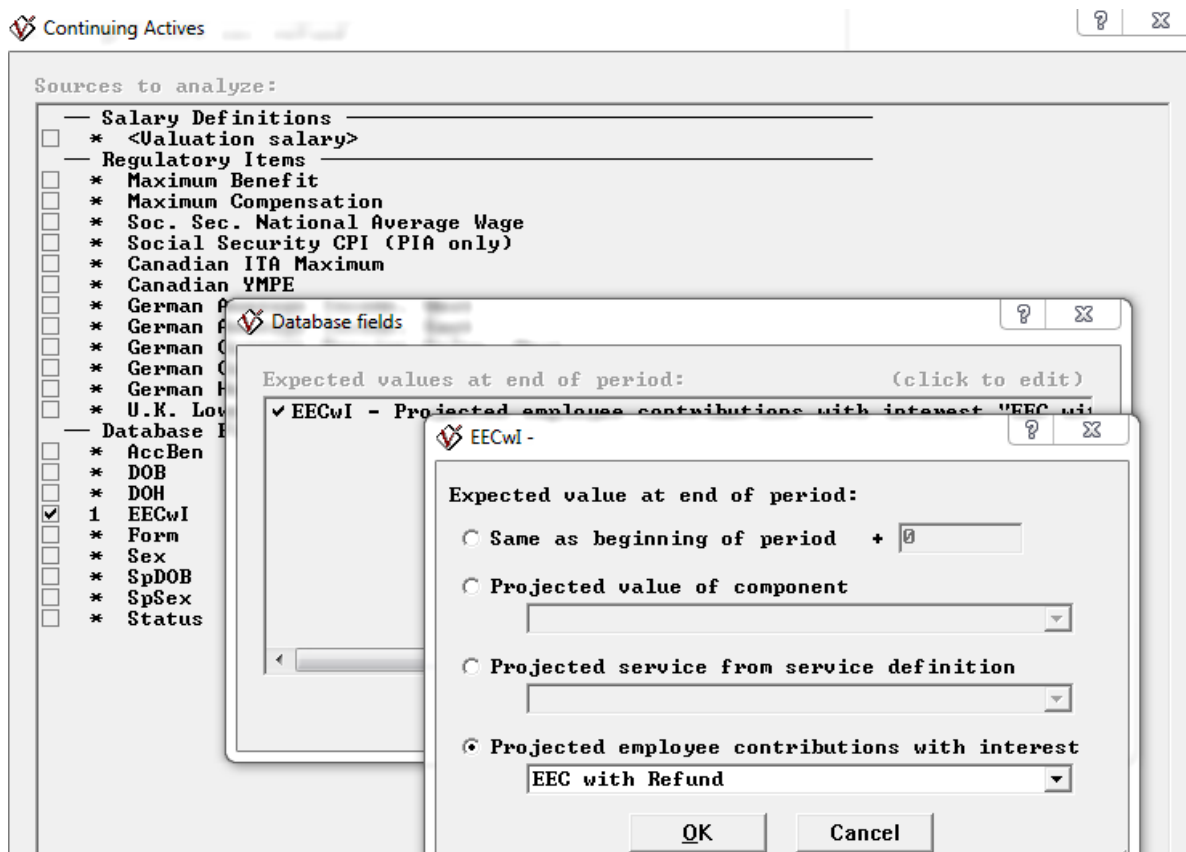
Variables	1/1/2015 Valuation with EEC Refund
B.O.Y. PBO (Active)	39,697,511
B.O.Y. PBO (Active) from Retirement	37,577,513
B.O.Y. PBO (Active) from Termination	1,865,635
B.O.Y. PBO (Active) from Death	
B.O.Y. PBO (Active) from Disability	
B.O.Y. PBO (Active) from Employee Contributions	0
B.O.Y. PBO (Active) from In-Service	
B.O.Y. PBO (Active) from Refund of Employee Contribs	254,364

Individual Results: For employee contributions, the variable zCurBft_eec now holds the expected contributions for the next year (previously it held the value of accumulated employee contributions). You also can save individual results related to any automatic refund payable.



(Gain)/Loss for Automatic Refund of Employee Contributions

If you have an employee contribution definition with the automatic refund option selected, ProVal can determine the gain/loss associated with the growth of the employee contributions with interest. To correctly capture this gain/loss, under the Continuing Actives topic select the database field that contains the employee contributions with interest. Then to determine the expected end of period value, select the radio button "projected employee contributions with interest" and select the applicable employee contribution definition.



If you have multiple employee contribution definitions with an automatic refund, to get accurate gain/loss results your employee contribution definitions will need to use different fields for employee contributions with interest as of the valuation date. The gain/loss tool can only determine an expected value for a field based on a single employee contribution definition. If your client data provides employee contributions with interest in a single field, consider using data defaults in census specifications to populate new fields, one field for each employee contribution definition. Or if you are using the selection expression to create different employee contributions for different segments of the active population, consider consolidating into a single employee contribution definition using #IF/#THEN/#ELSEIF logic.

Applying the 415(b) Limit

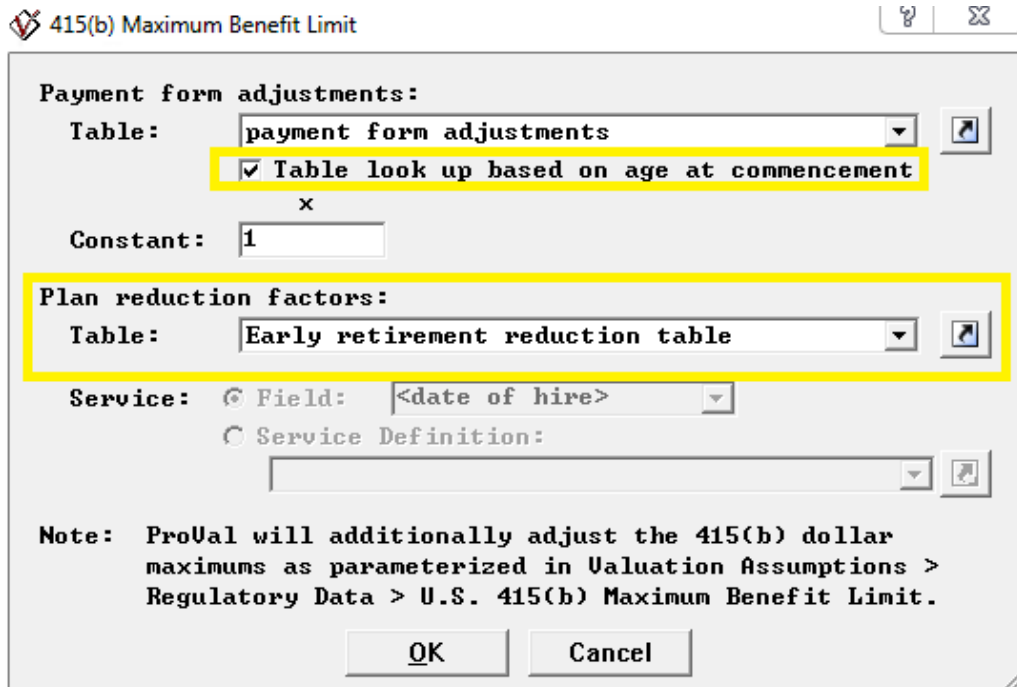
Prior to 2013, most practitioners applied the 415 limit by comparing the benefit payable at commencement (after the application of reduction factors) to the 415 limit determined at the commencement age. 2013 Gray Book Question #6 and 2014 Gray Book Question #32 surprised many when they indicated that the plan's accrued benefit (prior to application of reduction factors) must also be limited to the 415(b) limit determined at the plan's normal retirement age. The effect of this is that the plan's benefit is compared to 415(b) twice: at normal retirement age; and again at the actual commencement age.

The two comparisons are handled differently in ProVal. To apply the comparison at normal retirement age, use the #MAXBEN operator in the Benefit Definition. The benefit formula might look something like this:

```
Benefit formula
(NRBFc #MIN #MAXBEN 65) * ERF
```

In this formula, the normal retirement benefit is compared to the 415(b) limit determined at age 65 and then multiplied by the plan's early retirement reductions.

The comparison at commencement age is handled by the "Adjustments" button for the apply 415(b) maximum benefit limit. Prior to ProVal 3.07, the 415(b) limit was only reduced by the statutory reduction factors. In ProVal 3.07, plan reduction factors may be input under the "Adjustments" button and the 415 limit will be reduced by the greater of the plan and statutory reduction factors. ProVal 3.07 has also been enhanced to allow the lookup for payment form adjustment factors in a table to use commencement age (previously these factors were always determined at decrement age).

The dialog box is titled "415(b) Maximum Benefit Limit" and contains several sections. The "Payment form adjustments:" section includes a "Table:" dropdown set to "payment form adjustments", a checked checkbox "Table look up based on age at commencement", and a "Constant:" field with the value "1". The "Plan reduction factors:" section is highlighted with a yellow box and includes a "Table:" dropdown set to "Early retirement reduction table". Below this is a "Service:" section with a radio button for "Field:" set to "<date of hire>" and a radio button for "Service Definition:" which is currently empty. At the bottom, there is a "Note:" section with text about ProVal adjustments and "OK" and "Cancel" buttons.

The 415 sample life report has been enhanced to show the comparison of statutory and plan factors. Note that the plan factors are normalized to age 62 since there is no reduction in the 415(b) limit for ages 62 and greater.

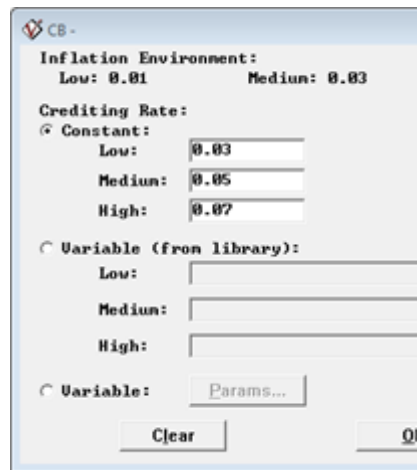
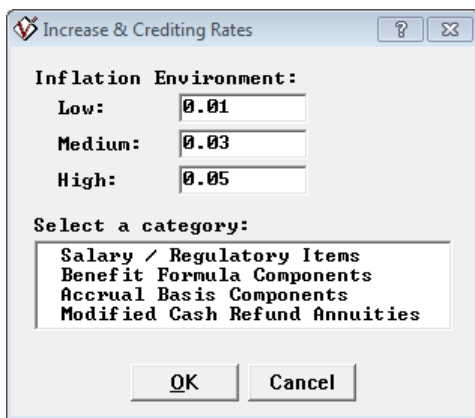
Member Age	Participation Service	Dollar Maximum	Plan Reduction Factors	Plan Factors Normalized to age 62	Statutory Adjustment Factors	Comm. Age Reduction/ Increase	Participation Fraction	Commencement Age Maximum
55	9.882514	210,000	0.550000	0.625000	0.605316	0.605316	0.988251	125,623.00
56	10.882514	210,000	0.600000	0.681818	0.647766	0.647766	1.000000	136,030.85
57	11.882514	210,000	0.650000	0.738636	0.694006	0.694006	1.000000	145,741.36
58	12.882514	210,000	0.700000	0.795455	0.744476	0.744476	1.000000	156,340.05
59	13.882514	210,000	0.750000	0.852273	0.799681	0.799681	1.000000	167,933.06
60	14.882514	210,000	0.800000	0.909091	0.860204	0.860204	1.000000	180,642.80
61	15.882514	210,000	0.840000	0.954545	0.926718	0.926718	1.000000	194,610.79
62	16.882514	210,000	0.880000	1.000000	1.000000	1.000000	1.000000	210,000.00
63	17.882514	210,000			1.000000	1.000000	1.000000	210,000.00
64	18.882514	210,000			1.000000	1.000000	1.000000	210,000.00
65	19.882514	210,000			1.000000	1.000000	1.000000	210,000.00

Forecasting enhancements for plans with account-balance benefits

Version 3.07 brings major enhancements to projection methodology for cash balance plans, floor offset plans, and any plan with account balances that receive interest credits. In a forecast, experience emerging in your capital market simulation will be better reflected when interpolating liabilities. More complex crediting schemes like caps and floors on the crediting rate are now directly supported. And plans incorporating DC benefits can now vary both the DB asset mix as well as the DC asset mix.

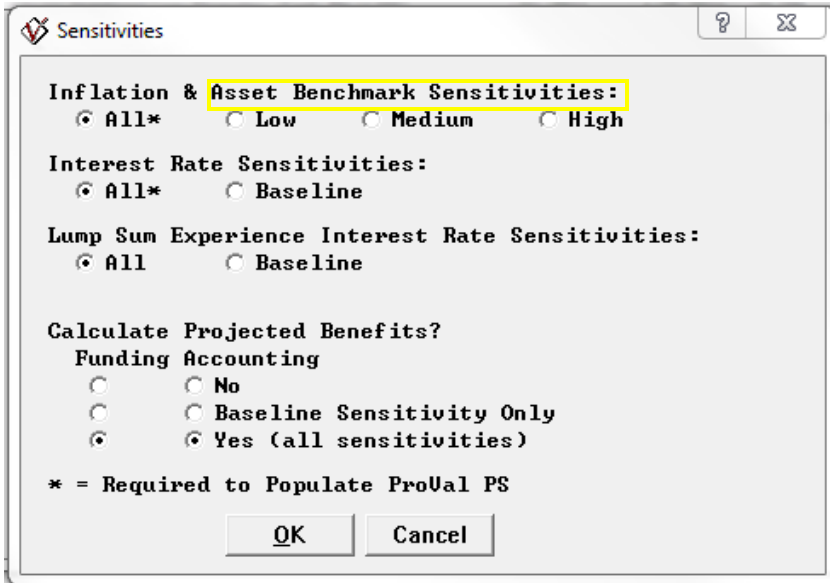
Previously, when defining sensitivity cores, increase rates to be applied to any Benefit Formula Component could vary with inflation only. For example, consider a cash balance plan whose interest credits are defined to be the yield on 30-year government bonds. When setting up projection assumptions in 3.06, increase rates for the Benefit Formula Component are set to vary with inflation: when inflation is 1%, credit the account balance with 3%; when inflation is 3% credit the account balance with 5%; and when inflation is 5% credit the account balance with 7%. Here, 2% is implicitly assumed as the real yield on the 30-year government bond, and cannot be changed during the forecast.

ProVal 3.06:

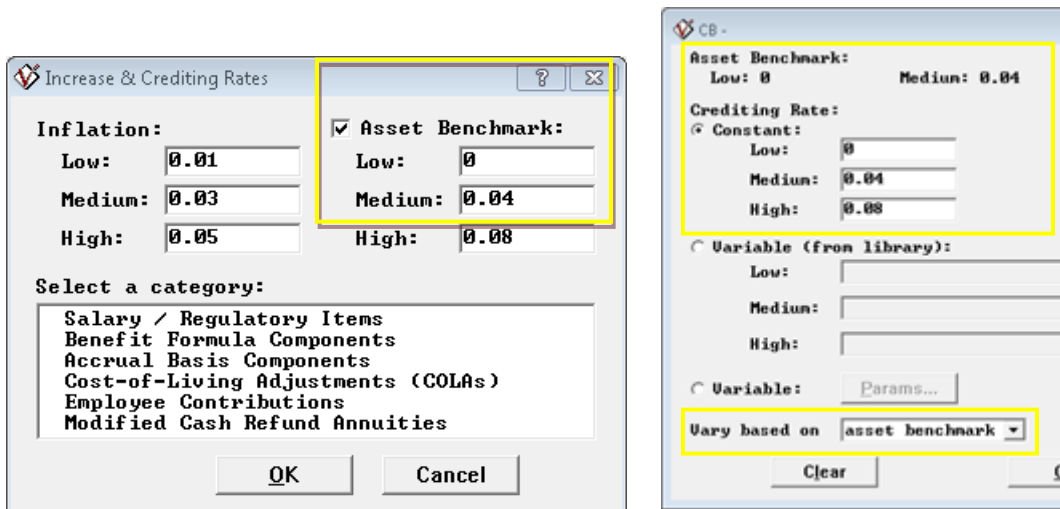


Although this approach generally produced reasonable projections, it ignored the applicable experience (30-year government bond yields) that was available, supplied from either deterministic assumptions or a capital market simulation. Instead it interpolated results for experience based on cumulative inflation for the forecast/trial.

The 3.07 enhancements provide a direct linkage between the crediting rate for the applicable Benefit Formula Component and the applicable economic experience provided from deterministic assumptions or a capital market simulation. The linkage is called an asset benchmark and sensitivities can be run during a core projection:



Thus, following the previous example, when setting up projection assumptions in 3.07, increase rates for the Benefit Formula Component are set to vary with the asset benchmark – in this example, the 30-year government bond yield – when the benchmark is 0%, credit the CB account balance with 0%; when the benchmark is 4% credit the account balance with 4%; and when the benchmark is 8% credit the account balance with 8%, as shown:



The asset benchmark is formally defined in stochastic assumptions, and is also a new deterministic assumption. There, the asset benchmark can be defined to be a yield or a return, with spreads, minimum and maximum values. Again, following the ongoing example of crediting 30-year government bond yields:

Benchmark Yields

Lump Sum Benchmark Yield based on: 30-Year Treasury

30-year Treasury Benchmark Yield for Year 0: 0.03 Look up...

Corporate Bond Benchmark Yield for Year 0:

Asset Benchmark based on: 30-Year Treasury Yield

*Spread over benchmark:

*Minimum rate:

*Maximum rate:

* = optional

OK Cancel

Interpolated results for experience will now be based on cumulative/compounded 30-year government bond yields for each forecast/trial.

The Asset benchmark can be set to any asset class in your capital market simulation. Thus, for example, a floor-offset plan can credit DC balances (modeled via a cash balance-type accrual in a Benefit Formula component) with returns reflecting its own asset allocation (i.e. a different mix than that is used for the DB assets). To do this, export the simulation to Excel, calculate the appropriate returns for the DC balances by hand, and append them onto the original capital market simulation as a new asset class using the import feature. In this example, a new asset class, called DCplan, was imported into the simulation.

Benchmark Yields

Lump Sum Benchmark Yield based on: 30-Year Treasury

30-year Treasury Benchmark Yield for Year 0: 0.03 Look up...

Corporate Bond Benchmark Yield for Year 0:

Asset Benchmark based on: DCplan

*Spread over benchmark: 0

*Minimum rate:

*Maximum rate:

* = optional

OK Cancel