Add-in Documentation

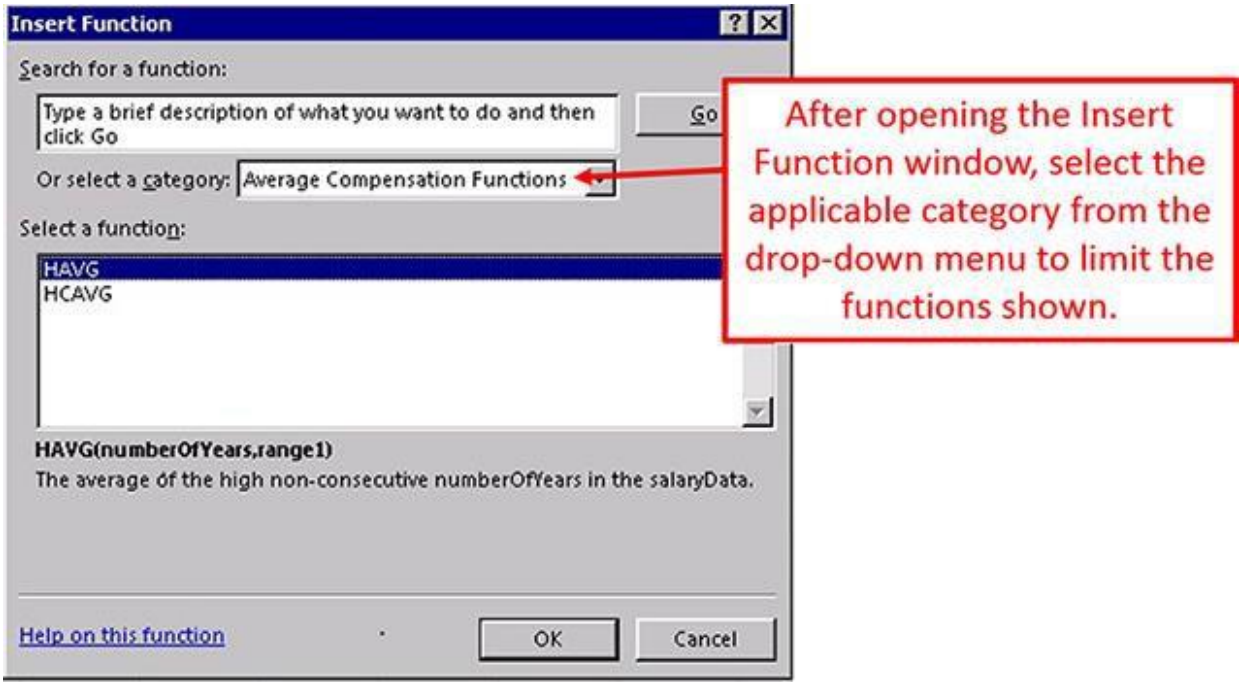
General Information

The ATPBGC MS Excel Add-In contains PBGC custom actuarial functions for Excel. The ATPBGC MS Excel Add-In can be installed on PBGC workstations via Microsoft Software Center (use GetIT to request authorization to install the Add-In via Microsoft Software Center). The Add-In is included in both the BCV and Archive installation bundles, and therefore users with BCV or Archive installed do not need to submit a separate request to install the Add-In. It is necessary to load the Add-In into Excel manually. This needs only to be done one time after the Add-In is installed on the workstation. As long as the ATPBGC Add-In is kept in memory, the custom functions will be available for use in spreadsheets.

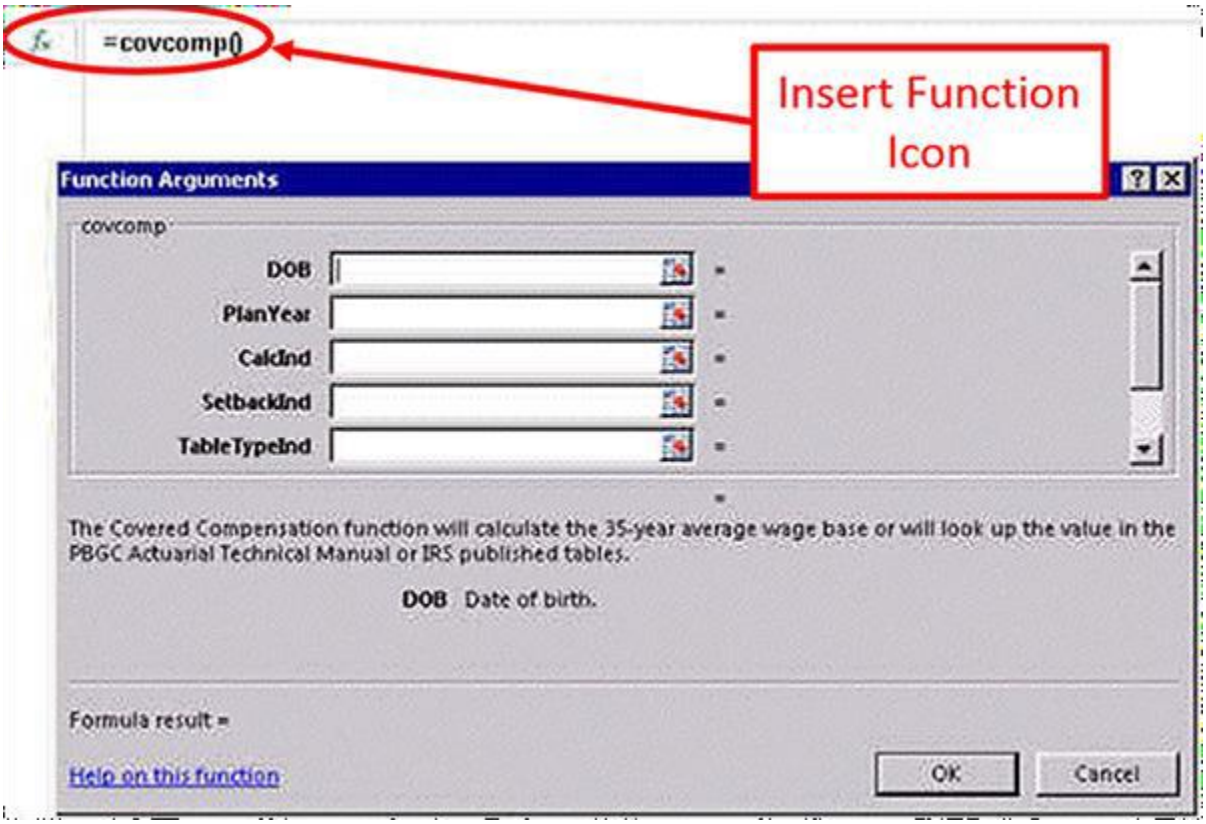
Some of the functions in the Add-In read information (e.g., interest rates, mortality, etc.) from the BCVATPBGC schema of the BCV Oracle database. The TRMD staff makes regular updates to this database based on periodic publications and based on requests by users.

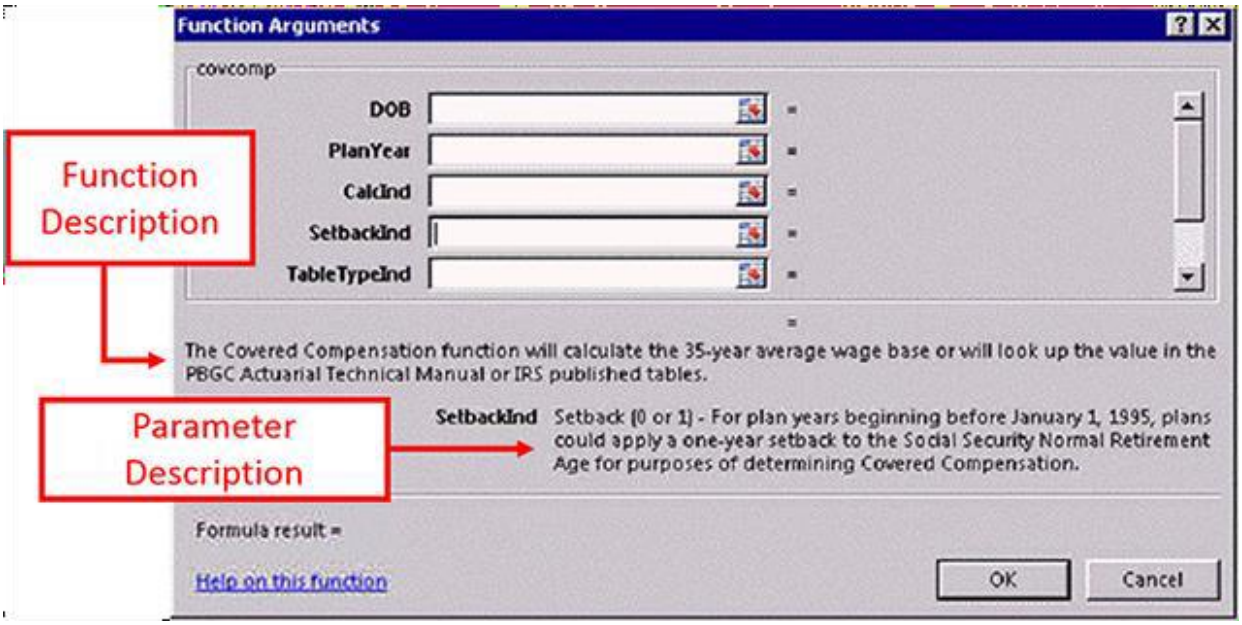
Help Using Functions

The ATPBGC functions are categorized in Excel using the same categories used in the BCV on-line manual. This categorization makes it easier to find an ATPBGC function from the Insert Function window.

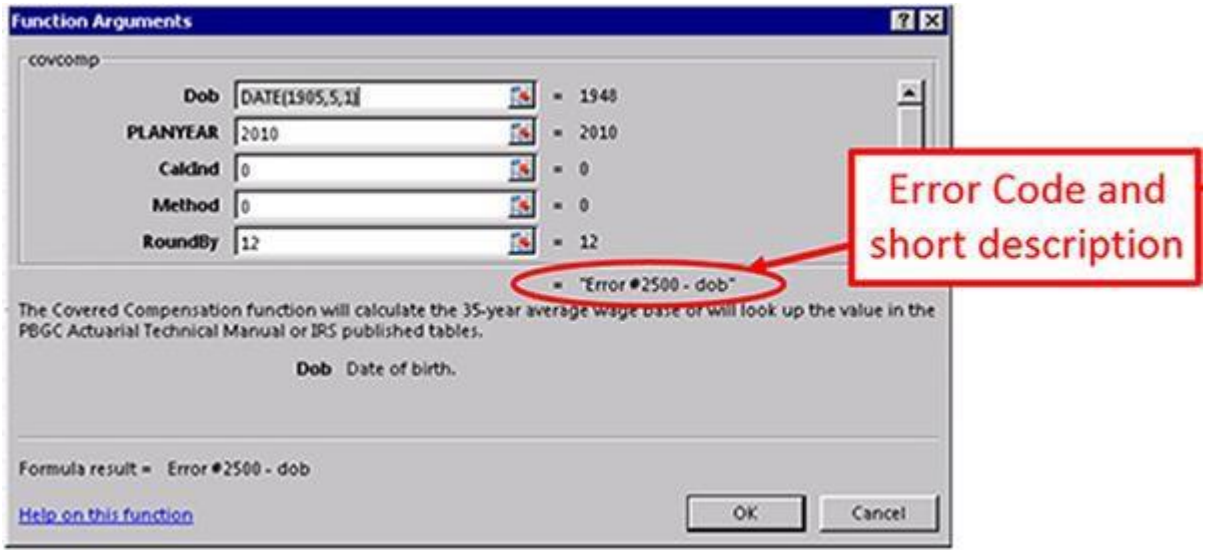


Users can obtain a list of parameters along with descriptions for each parameter for any of the functions in the Add-In while in Excel by clicking on the "insert function" icon when creating or editing a formula that includes one of the functions:





The functions return error codes when values entered in the parameters fail to meet the validations that exist for the function. If the error is generated from a module contained in the PIA32.dll, a 4-digit error code is returned by the function. If the error is generated from a module contained in ATPBG.dll or SSAADDIN.dll, an error code and short description are returned by the function as show below:



ATPBGC Add-In Files

ATPBGC2007.xlam in C:\Program Files (x86)\PBGC\ATPBGC
ATPBGC.dll in C:\Program Files (x86)\PBGC\ATPBGC
Pia32.dll in C:\Program Files (x86)\PBGC\ATPBGC
SSAaddin.dll in C:\Program Files (x86)\PBGC\ATPBGC
ATPBGC.config in C:\Program Files (x86)\PBGC\ATPBGC

Note: The files ATPBGC97.accdb, ATPBGC97.xla, ATPBGC.xla, ACTFUN32.dll, and NPVFV232.dll are no longer included in the installation package.

Pension Actuarial Add-ins Functions

List of Functions and their Formats

Age Functions

10/30/2014

ANB

02/26/2016

Format

ANB(*dob, thruDate*)

Return

The age nearest birthday as of *thruDate*.

Example

=ANB(DATE(35, 9, 1),DATE(89, 4, 1)) **returns 54**

Parameters

dob is the date of birth
thruDate is any date specified by the user

ATT

02/26/2016

Format

ATT(*dob, thruDate*)

Return

The attained age at the *thruDate*.

Example

=ATT(DATE(35, 9, 1),DATE(89, 4, 1)) **returns 53**

Parameters

dob is the date of birth
thruDate is any date specified by the user

Retirement Date Functions

02/26/2016

NRD

Format

NRD(*dob, nra*)

Return

The first of the month coincident with or next following *nra-th* birthday for an individual born on *dob*.

Example

=NRD(DATE(35, 9, 1), 65) **returns: 9/1/2000 or 36770**

Parameters

dob is the date of birth
nra is the age (=> 0, =< 75)

NRDA

02/26/2016

Format

NRDA(*dob, planDate, nra*)

Return

The plan anniversary date nearest attainment of *nra* for an individual born on *dob*.

Example

=NRDA(DATE(35, 9, 1),DATE(80, 1, 31), 65) **returns: 1/31/2001 or 36922**

Parameters

dob is the date of birth
planDate is the plan anniversary date
nra is the Age (=> 0, =< 75)

RETDATE

02/26/2016

Format

RETDATE(*birthdate, theRA, foma, Anniv*)

Return

Calculates a date using the inputs specified. Generally used for calculating retirement dates.

Example

=RETDATE(DATE(1950, 04, 15), 65) **returns: 05/01/2015**

=RETDATE(DATE(1950, 04, 01), 65) **returns: 04/01/2015**

=RETDATE(DATE(1950, 04, 01), 65, 1) **returns: 05/01/2015**

=RETDATE(DATE(1950, 04, 01), 70.5) **returns: 10/01/2020**

=RETDATE(DATE(1950, 04, 01), 70.5) **returns: 11/01/2020**

Parameters

birthDate is the Date of Birth
theRA is the retirement age
foma (optional) is the flag for first of month after:

- 0 = first of the month on or following (default);
- 1 = first of the month following;
- 2 = first of the month on or before;
- 3 = plan anniversary nearest
- 4 = first of the month nearest

Anniv (optional) must be populated with the plan anniversary when the foma parameter is set to 3. The plan anniversary should be entered as MMDD, e.g., "0301" for March 1 plan anniversary.

Error

Error 2186 - The value in *foma* is not 0, 1, 2, 3, or 4.
Error 2155 - The value in *theRA* is less than 0 or greater than 75.
Anniv parameter is not populated when *foma* is set to 3 or is populated when *foma* parameter is not set to 3.
Anniv parameter does not contain a valid MMDD entry (e.g., 0230).

RBD

12/28/2020

The function RBD is used to calculate the required beginning date based on the inputs specified.

Format

RBD(*RETSTAT, DOPT, SType, DOB, DOTE, DOD, FivePercentOwner, NonSpouseInd*)

Return

Calculates the required beginning date based on the inputs specified and on the SECURE Act of 2019, in which Congress changed the age of the required beginning date from 70 ½ to 72 for participants who have not yet reached age 70 ½ as of December 31, 2019.

Note The function calculates the required beginning date per the PBGC policy, which may differ from the plan provisions for determining the required beginning date (i.e., the function may produce required beginning dates that do not conform to plan provisions).

Example

=RBD("2",DATE(2008,2,2), "P",DATE(1949,6,30)) **returns 04/01/2020**
Last age 70 ½ birth date for participant

=RBD("2",DATE(2008,2,2), "P",DATE(1949,7,1)) **returns 04/01/2022**
First age 72 birth date for participant

=RBD("2",DATE(2008,2,2), "B",DATE(1949,6,30),,DATE(2015,1,1)) **returns 12/01/2019**
Last age 70 ½ birth date for spouse

=RBD("2",DATE(2008,2,2), "B",DATE(1949,7,1),,DATE(2015,1,1)) **returns 12/01/2021**
First age 72 birth date for spouse

=RBD("2",DATE(2008,2,2), "B",DATE(1949,6,30),,DATE(2015,1,1),, "Y") **returns 12/01/2016**
Last age 70.5 birth date for non-spouse beneficiary

=RBD("2",DATE(2008,2,2), "B",DATE(1949,7,1),,DATE(2015,1,1),, "Y") **returns 12/01/2016**
First age 72 birth date for non-spouse beneficiary

=RBD("3", DATE(2015, 06, 15), "P", DATE(1960, 08, 04), DATE(2015, 06, 15)) **returns 04/01/2033**

=RBD("3", DATE(2015, 06, 15), "P", DATE(1940, 08, 04), DATE(2015, 06, 15),,"Y") **returns 04/01/2012**

Parameters

RETSTAT is the retirement status as of DOPT (RETSTAT field). Valid values are "1", "2", "3", or "4".
DOPT is the date of plan termination.
SType is the calculation type. Valid values are "P" for participant's required beginning date and "B" for beneficiary's required beginning date.
DOB is the participant's date of birth (DOB field).
DOTE is the date of termination of employment (DOTE field). This is an optional parameter. Note that the function uses the earlier of the value in the *DOPT* parameter and the *DOTE* parameter as the date of termination of employment for the required beginning date calculation performed.
DOD is the participant's date of death (DOD field). This is an optional parameter when the *SType* parameter is set to "P".
FivePercentOwner is the indicator field for a 5% owner. Valid values are "Y" and "N". This is an optional parameter.

NonSpouseInd is the indicator for a non-spouse beneficiary (NON_SPOUSE_BENF field). Valid values are "Y" and "N". This is an optional parameter. Note, when the *SType* parameter is set to "B" and this parameter is set to "Y", the function will return the earlier of the participant's required beginning date and the 12/01 of the calendar year following the calendar in year in which the participant dies. This calculation of the required beginning date for a non-spouse beneficiary is not currently included in Policy 5.2-5.

Error

Invalid or missing value in *RETSTAT* parameter.
Invalid or missing value in *SType* parameter.
Missing value or date prior to 09/02/1974 in *DOPT* parameter.
Missing value in *DOB* parameter.
DOB > *DOTE*
DOB > *DOPT*
RETSTAT is '2' and *DOTE* >= *DOPT*
DOB > *DOD*
DOTE > *DOD*
DOPT > *DOTE* for *RETSTAT* = '3'
DOPT > *DOD* for *RETSTAT* = '3'
Missing value in *DOD* parameter when *SType* = 'B'

ADDMONTHS

02/26/2016

The function ADDMONTHS is used to obtain a date that is a specified number of months after or before the date specified.

Format

ADDMONTHS(*InputDate, NumMths*)

Return

Calculates a date that is a specified number of months after or before the date specified.The difference between the results of this function and just adding months in Excel is that this function will not roll over to the next month as Excel does in specific scenarios. For example, if the input date is 01/31/2015 and the number of months added is 5, Excel would return a result of 07/01/2015 whereas this function will return a result of 06/30/2015 (i.e., will not roll over to the next month).

Example

=ADDMONTHS(DATE(2015, 01, 31), 5) **returns 06/30/2015**

=ADDMONTHS(DATE(2015, 01, 31), -7) **returns 06/30/2014**

Parameters

InputDate is the input date for the calculation.
NumMths is any integer value (positive or negative).

Error

Missing value in *InputDate* parameter.

Non-integer value in *NumMths* parameter.

Service Functions

10/30/2014

COMPM

04/27/2017

Format

COMPM(*startDate, thruDate*)

Return

The number of completed months between the two Input dates.

Example

=COMPM(DATE(80, 1, 15),DATE(80, 3, 28)) **returns 2**

Parameters

startDate is the starting date
thruDate is the ending date

COMPAM

04/27/2017

Format

COMPAM(*startDate, thruDate*)

Return

The number of completed whole calendar months between the two Input dates.

Example

=COMPAM(DATE(80, 1, 15),DATE(80, 3, 28)) **returns 1**

Parameters

startDate is the starting date
thruDate is the ending date

COMPYM

02/26/2016

Format

COMPYM(*startDate, thruDate*)

Return

The number of completed years and months between the *startDate* and *thruDate*

Example

=COMPYM(DATE(80, 6, 15),DATE(85, 7, 20)) **returns 5.0833**

Parameters

startDate is the starting date
thruDate is the ending date

COMPAYM

02/26/2016

Format

COMPAYM(*startDate, thruDate*)

Return

The number of completed years and completed whole calendar months between the *startDate* and *thruDate*

Example

=COMPAYM(DATE(80, 6, 15),DATE(85, 7, 20)) **returns 5**

Parameters

startDate is the starting date
thruDate is the ending date

SERV

12/28/2020

Format

SERV(*startDate,thruDate,hoursRequirement,period,hoursPerPeriod,planAnniversary,extraDaysOptions,forcePlanMonth*)

Return

The service between the two dates, *startDate* and *thruDate*, calculated based on the other parameters. This function consolidates and extends the functionality of the existing SERV* functions. The REPORT function will generate a calculation report for the SERV function, which shows the details of the service calculation for each plan year in the participant's service history.

Parameters

StartDate – The first date of the service period
ThruDate – The last date of the service period
HoursRequirement – The hours requirement used to calculate the service. This can be a single number, a two column Excel range, or the string "NA":

- If it is a single number, then it is the minimum number of hours of service that must be attained in a plan year to receive a full year of service. This provides the functionality of the existing SERVYCA, SERVYPA, SERVYCP, SERVYPP, SERVYCW, and SERVYPW functions.
- If it is a two column Excel range, then partial service equal to the second column is given when the service in the plan year exceeds the hours requirement in the first column. This provides the functionality of the existing SERVBA and SERVBW functions.
- If it is the string "NA", then no hours requirement is used in the calculation. Instead, the SERV function calculates the exact number of years of service.

Period – Can be "M" (monthly) or "W" (weekly)
HoursPerPeriod – (optional) Specifies the number of service hours per period:

- If the Period is "M", then the default is 173.3333 [(52 weeks * 40 hours per week) / 12 months]
- If the Period is "W", then the default is 40

PlanAnniversary – (optional) A four-character string specifying the plan anniversary (e.g. "0301" for a March 1 plan anniversary). The default is "0101", a calendar year plan.
ExtraDaysOptions – (optional) Specifies the behavior of partial periods. This can be 1, 2, 3, 4, or 5:

- 1 (default) – extra days get the same service as days within whole periods. This option replicates the behavior of the existing SERVYCP, SERVYPP, SERVYCW, SERVYPW, and SERVBW functions
- 2 – any days worked in a period will give service for the entire period
- 3 – only whole periods are used; any partial periods worked will be ignored
- 4 – whole periods are extracted from extra days, and remaining days count as 1/365 year service. This option replicates the behavior of the existing SERVYPA, SERVYCA, and SERVBA functions
- 5 – extra days count as 1/365 year service

ForcePlanMonth – (optional) A rarely used parameter to force the use of the plan anniversary date when determining whole periods. Can be "Y" or "N" (the default is "N"). Will only potentially affect a result if the Period is "M" and the PlanAnniversary is not the 1st of the month.

Example

=SERV(DATE(1980,7,8),DATE(1985,12,31),1000,"M") **returns 6**
Equivalent to SERVYCA(DATE(1980,7,8),DATE(1985,12,31),1000)

=SERV(DATE(1980,3,1),DATE(1985,8,23),1000,"M",,"0301") **returns 5**
Equivalent to SERVYPA(DATE(1980,3,1),DATE(1985,8,23),DATE(1980,3,1),1000)

=SERV(DATE(1980,7,8),DATE(1985,12,31),1000,"M",160.5) **returns 5**
Equivalent to SERVYCP(DATE(1980,7,8),DATE(1985,12,31),1000,160.5)

=SERV(DATE(1980,3,1),DATE(1985,8,23),1000,"M",160.5,"0301") **returns 5**
Equivalent to SERVYPP(DATE(1980,3,1),DATE(1985,8,23),DATE(1980,3,1),1000,160.5)

=SERV(DATE(1980,7,10),DATE(1985,12,31),1000,"W") **returns 6**
Equivalent to SERVYCW(DATE(1980,7,10),DATE(1985,12,31),1000)

=SERV(DATE(1980,3,1),DATE(1985,8,21),1000,"W",,"0301") **returns 5**
Equivalent to SERVYPW(DATE(1980,3,1),DATE(1985,8,21),DATE(1980,3,1),1000)

=SERV(DATE(1980,7,10),DATE(1985,8,21),1000,"W",37.5,"0301") **returns 5**
No equivalent with other SERV* functions – assumes 37.5 hours worked per week

The next four examples use the following service array, which is assumed to be in cell addresses C1:D9.

Sample Service Array Table

Row Number	COL C	COL D
ROW 1	200	.2
…	400	.3

…	600	.4
…	800	.5
…	1000	.6
…	1200	.7
…	1400	.8
…	1600	.9
ROW 9	1800	1.0

=SERV(DATE(1983,7,1),DATE(1989,10,1),C1:D9,"M",,"0701") **returns 6.3**

Equivalent to SERVBA(DATE(1983,7,1),DATE(1989,10,1),DATE(1983,7,1),C1:D9)

=SERV(DATE(1983,7,1),DATE(1989,10,1),C1:D9,"M",150,"0701") **returns 6.2**

No equivalent with other SERV* functions – assumes 150 hours worked per month

=SERV(DATE(1983,7,1),DATE(1989,9,1),C1:D9,"W",,"0701") **returns 6.2**

Equivalent to SERVBW(DATE(1983,7,1),DATE(1989,9,1),DATE(1983,7,1),C1:D9)

=SERV(DATE(1983,7,1),DATE(1989,9,1),C1:D9,"W",34,"0701") **returns 5.6**

No equivalent with other SERV* functions – assumes 34 hours worked per week

If the *hoursRequirement* parameter is set to "NA", then the exact service is returned:

=SERV(DATE(1980,7,8),DATE(1985,12,31),"NA","M") **returns 5.483333333**

SERVBA

02/26/2016

Format

SERVBA(*startDate, thruDate, planDate, serviceArray*)

Return

The service between the two dates, *startDate* and *thruDate*, expressed in years and decimals using the *serviceArray*, applied on a *planDate* basis using averaged months and averaged days. The *startDate*, *thruDate*, and *planDate* must be provided as Excel dates. The *serviceArray* must be specified as an Excel range of column width 2 (for example, A1:B12).

Note The entries in both columns of the first row must be greater than zero. The entries in both columns must be strictly increasing.

Example

=SERVBA(DATE(83, 7, 1),DATE(89, 10, 1),DATE(83, 7, 1), C1:D9) **returns 6.3**

Parameters

startDate is the starting date

thruDate is the ending date
planDate is the plan anniversary date (only the day and month of the *planDate* are used for the calculation)
serviceArray is an Excel range of column width 2, as in the following Example:

Sample Service Array Table

Row Number	COL C	COL D
ROW 1	200	.2
…	400	.3
…	600	.4
…	800	.5
…	1000	.6
…	1200	.7
…	1400	.8
…	1600	.9
ROW 9	1800	1.0

SERVBW

02/26/2016

Format

SERVBW(*startDate, thruDate, planDate, serviceArray*)

Return

The service between the two dates, *startDate* and *thruDate*, expressed in years and decimals using the *serviceArray*, applied on a *planDate* basis using 8-hour work days. The *startDate*, *thruDate*, and *planDate* must be provided as Excel dates. The *serviceArray* must be specified as an Excel range of column width 2 (for example, A1:B12).

Note The entries in both columns of the first row must be greater than zero. The entries in both columns must be strictly increasing.

Example

=SERVBW(DATE(83, 7, 1),DATE(89, 9, 1),DATE(83, 7, 1), C1:D9) **returns 6.2**

Parameters

startDate is the starting date
thruDate is the ending date
planDate is the plan anniversary date (only the day and month of the *planDate* are used for the calculation)
serviceArray is an Excel range of column width 2, as in the Example for SERVBA

SERVYCA

02/26/2016

Format

SERVYCA(*startDate, thruDate, hoursRequired*)

Return

The service between the two dates, *startDate* and *thruDate*, expressed in full years using the *hoursRequired*, applied on a **calendar basis** using averaged months and averaged days (173.33 hours per month is assumed).

Example

=SERVYCA(DATE(80, 7, 8), DATE(85, 12, 31), 1000) **returns 6**

=SERVYCA(DATE(80, 7, 9), DATE(85, 12, 31), 1000) **returns 5**

Parameters

startDate is the starting date
thruDate is the ending date
hoursRequired is the number of hours for the rule (for example, 1000 for the 1000 hour rule)

SERVYCP

02/26/2016

Format

SERVYCP(*startDate, thruDate, hoursRequired, avgHours*)

Return

The service between the two dates, *startDate* and *thruDate*, expressed in full years using the *hoursRequired*, applied on a **calendar basis** using user-defined average hours per month.

Example

=SERVYCP(DATE(80, 7, 8),DATE(85, 12, 31), 1000, 160.5) **returns 5**

Parameters

startDate is the starting date
thruDate is the ending date
hoursRequired is the number of hours for the rule (e.g. 1000 for the 1000 hour rule)
avgHours is the user-defined average hours per month, expressed as a decimal number

SERVYCW

02/26/2016

Format

SERVYCW(*startDate, thruDate, hoursRequired*)

Return

The service between the two dates, *startDate* and *thruDate*, expressed in full years using the *hoursRequired*, applied on a **calendar basis** using 8-hour work days.

Example

=SERVYCW(DATE(80, 7, 10),DATE(85, 12, 31), 1000) **returns 6**

=SERVYCW(DATE(80, 7, 11),DATE(85, 12, 31), 1000) **returns 5**

Parameters

startDate is the starting date
thruDate is the ending date
hoursRequired is the number of hours for the rule (e.g. 1000 for the 1000 hour rule)

ERVYPA

02/26/2016

Format

SERVYPA(*startDate, thruDate, planDate, hoursRequired*)

Return

The service between the two dates, *startDate* and *thruDate*, expressed in full years using the *hoursRequired*, applied on a *planDate* basis using averaged months and averaged days (173.33 hours per month is assumed).

Example

=SERVYPA(DATE(80, 3, 1),DATE(85, 8, 23),DATE(80, 3, 1), 1000) **returns 5**

=SERVYPA(DATE(80, 3, 1),DATE(85, 8, 24),DATE(80, 3, 1), 1000) **returns 6**

Parameters

startDate is the starting date
thruDate is the ending date
planDate is the plan anniversary date (only the day and month of the *planDate* are used for the calculation)
hoursRequired is the number of hours for the rule (e.g. 1000 for the 1000 hour rule)

SERVYPP

02/26/2016

Format

SERVYPP(*startDate, thruDate, planDate, hoursRequired, avgHours*)

Return

The service between the two dates, *startDate* and *thruDate*, expressed in full years using the *hoursRequired*, applied on a *planDate* basis using user-defined average hours per month (*avgHours*).

Example

=SERVYPP(DATE(80, 3, 1),DATE(85, 8, 23),DATE(80, 3, 1), 1000, 160.5) **returns 5**

Parameters

startDate is the starting date
thruDate is the ending date

planDate is the plan anniversary date (only the day and month of the *planDate* are used for the calculation)
hoursRequired is the number of hours for the rule (for example, 1000 for the 1000 hour rule)
avgHours is the user-defined average hours per month, expressed as a decimal number

SERVYPW
02/26/2016

Format
SERVYPW(*startDate, thruDate, planDate, hoursRequired*)

Return
The service between the two dates, *startDate* and *thruDate*, expressed in full years using the *hoursRequired*, applied on a *planDate* basis using 8-hour work days.

Example
=SERVYPW(DATE(80, 3, 1), DATE(85, 8, 21), DATE(80, 3, 1), 1000) **returns 5**

=SERVYPW(DATE(80, 3, 1), DATE(85, 8, 22), DATE(80, 3, 1), 1000) **returns 6**

Parameters
startDate is the starting date
thruDate is the ending date
planDate is the plan anniversary date (only the day and month of the *planDate* are used for the calculation)
hoursRequired is the number of hours for the rule (for example, 1000 for the 1000 hour rule)

Note If the plan has an hoursRequired *rule that is NOT based on calendar or* planDate *basis, but instead is based on DOH or DOP to DOTE, use SERVYPA or SERVYPW and use DOH or DOP for the* planDate*.*

ERISA Vesting Functions

G515V
02/26/2016

Format
G515V(*service*)

Return
The vesting percent as a decimal for a participant with service years using the "5-15 graded" vesting schedule (25% after 5 years; 5% per year through year 10; 10% per year to year 15).

Example
=G515V(7) **returns .35**

=G515V(12) **returns .7**

Parameters
service is the number of years of vesting service (< 101)

RULE45
02/26/2016

Format

RULE45(*participantAge, service*)

Return

A participant is 50% vested when age plus service equals 45 and service equals 5, or if earlier, when service equals 10. The vesting percent increases by 10% per year thereafter. The Rule of 45. See Section 203 of ERISA, portion repealed by PL 99-514 regarding vesting schedules.

Example

=RULE45(40, 10) **returns 0.7**

=RULE45(50, 4) **returns 0.0**

=RULE45(35, 10) **returns 0.5**

=RULE45(40, 5) **returns 0.5**

=RULE45(40, 6) **returns 0.5**

=RULE45(41, 6) **returns 0.6**

Parameters

participantAge is a specified age for the participant
service is the number of years of vesting service

Note A participant who has completed at least 10 years of service has a nonforfeitable right to not less than 50 percent of the accrued benefit derived from employer contributions and to not less than an additional 10 percent for each additional year of service thereafter. So =RULE45(20,10) = .5 and =RULE45(20,11) = .60

Early Retirement Factors

09/24/2018

PBGCERF

03/29/2018

Format

PBGCERF(*monthsEarly*)

Return

The PBGC early retirement factor for a benefit commencing at *monthsEarly*.

Note There is a PBGCME function that can be used to compute the months early when computing the early retirement factor for the MIL calculation.

Example

=PBGCERF(19) **returns .8892**

Parameters

monthsEarly is the number of months prior to a participant's normal retirement age of 65 (=> 0, < 780).

Note See details in Actuarial Technical Manual from Section III.E.4 or IV.A.3.a.

PBGCME

03/29/2018

Format

PBGCME(*DOPT, BPD, XRD, DOB, SDOB, BDOB, Nonspind, RETSTAT, ID, Disabmil*)

Return

The months early that is required as an input to the PBGCERF function.

Note The months early are computed from the 65th birthday.

Example

=PBGCME(DATE(2015,06,15), DATE(2013,06,15), DATE(2010,06,01), DATE(1950,05,01), DATE(1954,05,01), 0, 0, “N”, “1”, “1”, "N") **returns 22**

Parameters

DOPT is the Date of Plan Termination.
BPD is the Bankruptcy Petition Date—populated only when the plan terminates while in bankruptcy (enter 0 or reference a blank cell when *BPD* does not apply). The date entered in this parameter must be on or after 09/16/2006 and before the date entered in the *DOPT* parameter.
XRD is the Participant/AP’s Actual or Expected Date of Retirement—must be on or before date entered in the *DOPT* parameter if "1" is entered in the *RETSTAT* parameter and must be on or after the first of the month on or following the date entered in the *DOPT* parameter if a value other than "1" is entered in the *RETSTAT* parameter (for a beneficiary record where the beneficiary is receiving a QPSA benefit because the participant died before retiring, *XRD* should be populated with the commencement date of the QPSA benefit but otherwise *XRD* should be populated with the commencement date of the participant’s benefit).
DOB is the Participant/AP’s date of birth—must be before date entered in the *DOPT*, *BPD*, and *XRD* parameters.
SDOB is the Spouse’s Date of Birth—must be before date entered in the *XRD* parameter.
BDOB is the Beneficiary’s Date of Birth—must be before date entered in the *XRD* parameter.
Nonspind is the Non-Spouse Beneficiary Indicator—must be equal to "Y" or "N".
RETSTAT is the retirement status at *DOPT*—must be "1", "2", "3", or "4".
ID is the record type (participant, beneficiary, or alternate payee)—must be "1", "2", or "4".
Disabmil is the Disability Max Indicator—must be "Y" or "N" (this is an optional parameter and when left blank defaults to "N"). The setting is based on eligibility for the disability maximum insurance limit at the earlier of *DOPT* and *BPD*.

ERFAEQ

09/24/2018

*Note The ERFAEQ function replaces the ERFA function. This function allows the user to select the type of calculation method (*CalcMethod*), "Exact" or "Woolhouse"; and whether Mortality is being included in the deferral period or not. The ERFAEQ function is also able to handle the months-early parameter that is not divisible by 12.*

Format

ERFAEQ(*XBRD, sex, theNRA, EarlyMonths, TheCPeriod, TheMNameHandle, TheFNameHandle, CalcMethod, DeferralMort, intMethod, PHSorPY, NumDecimals, TableInd, DOPT, PreMMortality, PreFMortality*)

Return

The actuarially equivalent retirement factor for a benefit commencing the specified number of months early from the specified normal retirement age based on the specified interest, interest method, mortality, calculation method, and whether or not to include mortality during the deferral period in the calculation. If the calculation specified is Woolhouse (MP, QP, or SP), and the months early is not divisible by 12, the factor is obtained by using linear interpolation. Rounding of the factors at whole numbers of years early can be specified when linear interpolation is to be performed between rounded factors.

Example

=ERFAEQ(.06,"M", 65, 120, 0, "GM83", "GF83", "MP", "Y") **returns 0.4073**

=ERFAEQ(DATE(2014, 07, 14),"M", 120, 0, DATE(2014, 07, 14), DATE(2014, 07, 01), "MP", "Y", "N", "0") **returns 0.5262**

=ERFAEQ(DATE(2014, 03, 01), "M", 120, 0, DATE(2014, 07, 01), DATE(2014, 07, 01), "MP", "Y", "L", "0101") **returns 0.4683**

Parameters

XBRD
sex entered as "M" for male or "F" for female
theNRA is the participant's Normal Retirement Age.
EarlyMonths is the number of months prior to *theNRA*.
TheCPeriod is the number of months certain in the normal single form (Since the valuation benefit may be the normal married form which could have a different number of months certain from the normal single form. DO NOT fill in the value needed for the input parameter *TheCPeriod* from the ASD database field MTHS, which is reserved to hold the number of months certain for the valuation benefit. Instead, use the field MthsNSF which is reserved to hold the number of months certain for the normal single form).
TheMNameHandle
TheFNameHandle
CalcMethod
DeferralMort parameter indicates whether mortality should be included in the deferral period or not ("Y" or "N").
intMethod (optional)
PHSorPY (optional)
NumDecimals is an optional parameter that can be populated with an integer value from 0 to 9. An entry in this parameter is only used when the *CalcMethod* is set to MP, QP, or SP (i.e., Woolhouse). The function will round the factors for whole numbers of years early to the number of decimals specified before performing linear interpolation to calculate the factors for partial numbers of years early. No intermediate rounding is performed when the parameter is not populated or is populated with 0.
TableInd (optional)

DOPT (optional)
PreMMortality (optional)
PreFMortality (optional)

Error

Certain Period Less Than 0.
Interest rate less than 0.0
Months Early is too large
Interest rate greater than or equal to 1.0
Invalid Months Early
Months Early Less Than 0
NRA less than 0
NRA greater than or equal to 125
Invalid Calculation Method
Missing Calculation Method
Invalid Deferral Mortality setting
Missing Deferral Mortality setting
NRA minus months early less than 0 for Exact
NRA minus multiple of 12 greater than months early less than 0 for Woolhouse
NRA plus months certain is greater than or equal to 125 for Exact
NRA plus months certain must be less or = 124 for *CalcMethod* "MP"
NRA plus months certain is greater than 124 for Woolhouse
Division by Zero
Invalid value for gender
Missing value for gender
Invalid male mortality table
Invalid female mortality table
Missing male mortality table
Missing female mortality table
Missing or invalid entry for *intMethod* parameter
Range entered for *XBRD* parameter does not satisfy interest range requirements
Invalid date entered for *XBRD* parameter
Invalid value entered for *TheMNameHandle* or *TheFNameHandle* parameters
Missing or invalid health status code for *PHSorPY* parameter
Missing or invalid plan anniversary for *PHSorPY* parameter
NumDecimals parameter is populated with something other than an integer value from 0 to 9
TableInd parameter is populated with something other than an integer from 0 to 7
Invalid date entered for *DOPT* parameter
Invalid value entered for *PreMMortality* or *PreFMortality* parameters

Late Retirement Factors

09/24/2018

LRFAEQ

09/24/2018

Format

LRFAEQ(*XBRD, sex, TheNRA, Latemonths, TheCPeriod, TheMNameHandle, TheFNameHandle, CalcMethod, DeferralMort, intMethod, PHSorPY, StdNRA, NumDecimals, TableInd, DOPT, PreMMortality, PreFMortality*)

Return

The actuarially equivalent retirement factor for a benefit commencing the specified number of months late from the specified normal retirement age based on the specified interest, interest method, mortality, calculation method, whether or not to include mortality during the deferral period in the calculation. If the calculation specified is Woolhouse (MP, QP, SP), and the months late is not divisible by 12, the factor is obtained by using linear interpolation. Rounding of the factors at whole numbers of years late can be specified when linear interpolation is to be performed between rounded factors.

Example

=LRFAEQ(.06, "M", 65, 120, 0, "GM83", "GF83", "MP", "Y") **returns 3.2925**

=LRFAEQ(DATE(2014, 03, 01), "M", 65, 120, DATE(2014, 07, 14), "MP", "Y", "N", "0") **returns 2.9555**

=LRFAEQ(DATE(2014, 03, 01), "M", 65, 120, 0, DATE(2014, 07, 01), DATE(2014, 07, 01), "MP", "Y", "L", "0101") **returns 2.6285**

Parameters

XBRD

sex entered as "M" for male or "F" for female

TheNRA is the participant's Normal Retirement Age or the age at which the deferral period starts.

Latemonths is the number of months in the deferral period.

TheCPeriod is the number of months certain in the normal single form (Since the valuation benefit may be the normal married form which could have a different number of months certain from the normal single form. DO NOT fill in the value needed for the input parameter *TheCPeriod* from the ASD database field MTHS, which is reserved to hold the number of months certain for the valuation benefit. Instead, use the field MthsNSF which is reserved to hold the number of months certain for the normal single form).

TheMNameHandle

TheFNameHandle

CalcMethod

DeferralMort parameter indicates whether mortality should be included in the deferral period or not ("Y" or "N").

intMethod (optional)

PHSorPY (optional)

StdNRA is the standard age at which the deferral period starts, usually the standard normal retirement age in the plan, e.g., 65. This is an optional parameter that impacts the result if the calculation method is Woolhouse and the age in *TheNRA* parameter is greater than the age in *StdNRA* parameter. When this parameter is populated, the function will take the ratio of the late retirement factor for a deferral that starts at the age in *StdNRA* parameter and ends at the age which is equal to the sum of the age in *TheNRA* parameter plus the months in *LateMonths* parameter to the late retirement factor for a deferral that starts at the age in *StdNRA* parameter and ends at the age in *TheNRA* parameter.

NumDecimals is an optional parameter that can be populated with an integer value from 0 to 9. An entry in this parameter is only used when the *CalcMethod* is set to MP, QP, or SP (i.e. Woolhouse). The function will round the factors for whole numbers of years late to the number of decimals specified before performing linear interpolation to calculate the factors for partial numbers of years late. No intermediate rounding is performed when the parameter is not populated or is populated with 0.
TableInd (optional)
DOPT (optional)
PreMMortality (optional)
PreFMortality (optional)

Error

Certain Period Less Than 0
Interest rate less than 0.0
Interest rate greater than or equal to 1.0
NRA less than 0
NRA greater than or equal to 125
Invalid value for gender
Missing value for gender
Invalid male mortality table
Invalid female mortality table
Missing male mortality table
Missing female mortality table
Invalid Calculation Method
Missing Calculation Method
Invalid Deferral Mortality setting
Missing Deferral Mortality setting
Months Late Less Than 0
NRA plus months certain is greater than or equal to 125 for Exact
NRA plus months certain is greater than 124 for Woolhouse
NRA plus months late greater than or equal to 125 for Exact
NRA plus months late greater than 124 for Woolhouse
NRA greater than 124 for Woolhouse
NRA plus months late plus months certain is greater than or equal to 125 for Exact
NRA plus months late plus months certain is greater than 124 for Woolhouse
Division By Zero
Missing or invalid entry for *intMethod* parameter
Range entered for *XBRD* parameter does not satisfy interest range requirements
Invalid date entered for *XBRD* parameter
Invalid value entered for *TheMNameHandle* or *TheFNameHandle* parameters
Missing or invalid health status code for *PHSorPY* parameter
Missing or invalid plan year or 30-year treasury code for *PHSorPY* parameter
Missing or invalid plan anniversary for *PHSorPY* parameter
Value in *StdNRA* is greater than the value in *TheNRA*
NumDecimals parameter is populated with something other than an integer value from 0 to 9
TableInd parameter is populated with something other than an integer from 0 to 7

Invalid date entered for *DOPT* parameter
Invalid value entered for *PreMMortality* or *PreFMortality* parameters

PBGCLRF

03/29/2018

PBGCLRF function returns the PBGC Late Retirement Factors (used for the MIL calculation) for any age greater than or equal to 65 and less than or equal to 111. When using the function to compute a late retirement factor to adjust a plan benefit for late commencement (i.e. not computing the late retirement factor for the MIL), the function will return a late retirement factor for ages less than 65 in the case where NRD is before age 65 (i.e. the optional NRA parameter has been populated with an age less than 65). The function determines the late retirement factor using a lookup table based on the age specified. The user should compute the number of complete months from the 65th birthday to XRD/DOR (DOPT for pre-DOPT retirees) – ML_XRD_MAXLIM and then provide as the input age: 65 +[ML_XRD_MAXLIM / 12].

Note There is a PBGCML function that can be used to compute the months late when computing the late retirement factor for the MIL calculation.

PBGC Late Retirement Factors are used to determine the plan monthly benefit when late retirement factors or assumptions are not available (that is, the plan did not include late retirement assumptions, and no plan practice was available).

In some cases the late retirement factor needed for a plan benefit is for a deferral from an age other than 65 (e.g., participant's normal retirement age is not 65, participant worked beyond age 65, etc.) or the plan benefit may contain a certain period (i.e., C&C instead of SLA). For these cases, there are two optional parameters provided, but these optional parameters should only be used when calculating a late retirement factor to be applied to the plan benefit and should not be used when calculating a late retirement factor to be used for calculating the MIL.

Format

PBGCLRF(*Age, NRA, Mths*)

Example

=PBGCLRF(70) **returns 1.66**

Parameters

Age specifies the participant's age.
NRA (optional) specifies the plan normal retirement age. Should only be used when calculating a late retirement factor for the plan benefit.
Mths (optional) specifies the months certain. Should only be used when calculating a late retirement factor
for the plan benefit.

Error

Age < 65 or *Age* > 111 (when *NRA* is not populated)
Age < *NRA* (when *NRA* is populated)
Mths < 0 (when *Mths* is populated)

PBGCML

03/29/2018

Format

PBGCML(*DOPT, BPD, XRD, DOB, SDOB, BDOB, Nonspind, RETSTAT, ID*)

Return

The months late that can be added to age 65 to obtain the age that is required as an input to the PBGCLRF function.

Note The months late are computed from the 65th birthday.

Example

=PBGCML(DATE(2015,06,15), DATE(2013,06,15), DATE(2010,06,01), DATE(1945,05,01), 0, 0, "N", "1", "1") **returns 37**

Parameters

DOPT is the Date of Plan Termination.
BPD is the Bankruptcy Petition Date—populated only when the plan terminates while in bankruptcy (enter 0 or reference a blank cell when *BPD* does not apply). The date entered in this parameter must be on or after 09/16/2006 and before the date entered in the *DOPT* parameter.
XRD is the Participant/AP's Actual or Expected Date of Retirement—must be on or before date entered in the *DOPT* parameter if "1" is entered in the *RETSTAT* parameter and must be on or after the first of the month on or following the date entered in the *DOPT* parameter if a value other than "1" is entered in the *RETSTAT* parameter (for a beneficiary record where the beneficiary is receiving a QPSA benefit because the participant died before retiring, *XRD* should be populated with the commencement date of the QPSA benefit but otherwise *XRD* should be populated with the commencement date of the participant's benefit).
DOB is the Participant/AP's date of birth—must be before date entered in the *DOPT*, *BPD*, and *XRD* parameters.
SDOB is the Spouse's Date of Birth—must be before date entered in the *XRD* parameter.
BDOB is the Beneficiary's Date of Birth—must be before date entered in the *XRD* parameter.
Nonspind is the Non-Spouse Beneficiary Indicator—must be equal to "Y" or "N".
RETSTAT is the retirement status at *DOPT*—must be "1", "2", "3", or "4".
ID is the record type (participant, beneficiary, or alternate payee)—must be "1", "2", or "4".

PBGC Interest Functions

09/29/2014

IIF

02/26/2016

Format

IIF(*startDate, thruDate*)

Return

The interest index factor for a stream of payments between *startDate* and *thruDate* using PBGC immediate lump-sum rates

Example
=IIF(DATE(80, 6, 15), DATE(87, 7, 13)) **returns 119.79**

Parameters
startDate is payments start date (> 9/1/74)
thruDate is payments thru date

IIR
02/26/2016

Format
IIR(*interestDate*)

Return
The interest index rate at *interestDate* using PBGC immediate lump-sum interest rates

Example
=IIR(DATE(88, 12, 28)) **returns 3.1986**

Parameters
interestDate is a user-specified date (> 9/1/74)

IIRL
02/26/2016

Format
IIRL(*startDate, thruDate*)

Return
The Lump Sum Interest factor for *startDate* and *thruDate* using PBGC immediate lump-sum interest rates

Example
=IIRL(DATE(88, 12, 28),DATE(89, 6, 30)) returns 1.0384

Parameters
startDate is the DOPT (Must be > 9/1/74)
thruDate is the date of distribution (> 9/1/74)

PACSIIF
02/26/2016

Format
PACSIIF(*startDate, thruDate, estIndicator, lastDate*)

Return
The PBGC interest index factor for a stream of payments between *startDate* and *thruDate* using PACS interest rates. The use of estimated rates can be specified if desired. The factor returned would be applied to the monthly payment to obtain the single lump sum value of the payments from *startDate* to *thruDate* compiled with interest to the month following *thruDate*.

Example

=PACSIIF(DATE(2009, 08, 01), DATE(2012, 09, 01)) **returns 39.00066583**

=PACSIIF(DATE(2010, 08, 01), DATE(2014, 10, 01)) **returns 52.68292004** (date for last available PACs rate is 07/01/2014)

=PACSIIF(DATE(2009, 08, 01), DATE(2012, 09, 01), 2, DATE(2012, 09, 01)) **returns 39.00066583**

=PACSIIF(DATE(2009, 08, 01), DATE(2012, 09, 01), 2, DATE(2012, 07, 01)) **returns 39.00449875**

Parameters

startDate is payments start date (> 9/1/74)
thruDate is payments thru date
lastDate is last date (used if estIndicator = 2)
lastDate (default value 0) (optional parameter)
estIndicator is estimate indicator (optional parameter).
Valid Entries for *estIndicator*:

0 - function will only use PACS interest rates and will return an error code if *thruDate* is after the last available PACS interest rate;

1 - function will always use actual PACS interest rates when available and will use the last available PACS interest rate for any months included in the calculation that are after the date of the last PACS interest rate.

2 - function will use actual PACS interest rates for months included in the calculation that are on or before *lastDate* and use the PACS interest rate for *lastDate* for any months included in the calculation that are after *lastDate*.

Error

startDate < 9/1/74
thruDate < 9/1/74
startDate > *thruDate*
startDate is not the 1st of the month
thruDate is not the 1st of the month
Invalid entry in *estIndicator*
Entry in *lastDate* when *estIndicator* is not 2
A missing entry in *lastDate* when *estIndicator* is 2
lastDate is either before 09/01/1974 or after the date for the last available PACS rate
thruDate is after the date for the last available PACS rate

PACSIIR

02/26/2016

Format

PACSIIR(*InterestDate, InterestRateType*)

Return

The PBGC interest index rate at *InterestDate* using PACS backpayment rates.

Example

=PACSIIR(DATE(88, 12, 01)) **returns 3.198628282**

=PACSIIR(DATE(88,12,01), C) **returns 3.198628282**

=PACSIIR(DATE(88,12,01), M) **returns 1.0725**

=PACSIIR(DATE(88,12,01), "") **returns Error #2351**

Parameters

InterestDate is a user-specified date (> 9/1/74)
InterestRateType is an optional parameter that indicates whether to use the Cumulative or Monthly Interest Rate. It is C or M.

Note An optional parameter (InterestRateType) allows the user to indicate whether the calculation should use Cumulative or Monthly rate. If the parameter is included but no M or C is specified and Error is returned but if the parameter is not included the calculation defaults to C and returns the Cumulative Interest Rate. The date must be the 1st of the month.

Error

startDate < 9/1/74
startDate > last record available in The ATPBGC database *startDate* is not the 1st of the month
InterestRateType is empty or different than C or M.

PACSIIRL

02/26/2016

Format

PACSIIRL(*startDate, thruDate, estIndicator, lastDate*)

Return

The PBGC lump sum interest rate factor for accumulating a lump sum with interest start *startDate* to *thruDate* using PACS interest rates. The use of estimated rates can be specified if desired. The factor returned would be applied to the lump sum payment at the start date to obtain the lump sum payment with interest at the *thruDate*.

Example

=PACSIIRL(DATE 2009, 08, 01), DATE(2012, 09, 01)) **returns 1.061964036**

=PACSIIRL(DATE 2010, 08, 01), DATE(2014, 10, 01), 1, 0) **returns 1.065594121** (date for last available PACS rate is 07/01/2013)

=PACSIIRL(DATE 2009, 08, 01), DATE(2012, 09, 01), 2, DATE(2012, 09, 01)) **returns 1.061964036**

=PACSIIRL(DATE 2009, 08, 01), DATE(2012, 09, 01), 2, DATE(2012, 07, 01)) **returns 1.06199912**

Parameters

startDate is the DOPT (Must be > 9/1/74)
thruDate is the date of distribution (> 9/1/74)
lastDate (optional parameter)

estIndicator (optional parameter).
Valid Entries for *estIndicator*:

0 - function will only use PACS interest rates and will return an error code if *thruDate* is after the last available PACS interest rate;

1 - function will always use actual PACS interest rates when available and will use the last available PACS interest rate for any months included in the calculation that are after the date of the last PACS interest rate.

2 - function will use actual PACS interest rates for months included in the calculation that are on or before *lastDate* and use the PACS interest rate for *lastDate* for any months included in the calculation that are after *lastDate*.

Error

startDate < 9/1/74
thruDate < 9/1/74
startDate > *thruDate*
startDate is not the 1st of the month
thruDate is not the 1st of the month
startDate or *thruDate* > last record available in The ATPBGC
database Invalid entry in *estIndicator*
Entry in *lastDate* when *estIndicator* is not 2
A missing entry in *lastDate* when *estIndicator* is 2
lastDate is either before 09/01/1974 or after the date for the last available PACS rate

SPARR

04/27/2017

The function SPARR will return the SPARR interest rate for the date specified.

Format

SPARR(*TID, UNGB*)

Return

SPARR interest rate for the date specified

Example

=SPARR(Date(2007,01,01), 1000000) **returns 0.0435**

=SPARR(Date(2007,08,15), 1000000) **returns 0.0435**

=SPARR(Date(2000,07,01), 0) **returns 0.0458**

Parameters

TID is termination initiation date
UNGB is unfunded non-guaranteed benefit liability for the plan

Error

Date entered is before 12/18/1990 or after the effective period for the last available SPARR interest rate
UNGB is greater than 20,000,000

SPDRR

04/27/2017

The function SPDRR will return the SPDRR interest rate for the date specified.

Format

SPDRR(*TID, UNGB*)

Return

SPDRR interest rate for the date specified

Example

=SPDRR(Date(2007,01,01), 1000000) **returns 0.2842**

=SPDRR(Date(2007,08,15), 1000000) **returns 0.2842**

=SPDRR(Date(2000,07,01), 0) **returns Error #2376**

Parameters

TID is termination initiation date
UNGB is unfunded non-guaranteed benefit liability for the plan

Error

Date entered is before 09/16/2006 or after the effective period for the last available SPDRR interest rate
UNGB is greater than 20,000,000

XRA/XRD Functions

BL

09/30/2016

Format

BL(*dopt, dob, dote, ishut, iquit, noit, retstat, eura, gmbnra_vb_vbnf*)

Return

The Benefit Level (LOW, MED, HIGH, IMM, NA) for XRA purpose.

For plans terminated on or after 08/01/1979 within a closed down facility (ishut="Y"), if participant terminated less than one year prior to *dopt*, BL will be set to "IMM". If participant terminated one or more years prior to *dopt*, BL will be determined by checking the "allow receipt of benefit while still employed with DOPT employer" provision, (the *iquit* parameter). If *iquit* is "N", then BL is "HIGH"; if *iquit*="Y", then BL is computed by using "Method 3".

For plans terminated on or after 08/01/1979 within a facility which is not shut down, (*ishut*="N"), if participant terminated prior to *dopt*, BL will be set to "HIGH". If participant was active at *dopt*, BL will be determined by using "Method 3".

One exception for plans terminated on or after 08/01/1979 while NOIT was filed before 04/01/1981 within a closed down facility: BL will be set to "HIGH" if participant terminated one or more years prior to *dopt* regardless the value of *iquit*.

For plans terminated prior to 08/01/1979, BL will be set to "IMM" if the facility is closed down, and will be determined by using "Method 3" if the facility is not closed down.

Note For retiree BL is always set to "NA". If Method 3 is employed, BL will be determined by searching through the Benefit Rate table effective at dopt using the year participant reaches eura as the key.

Example

=BL(DATE(91, 12, 16), DATE(53, 4, 30), DATE(88, 7, 1),"Y", "N", "Y", "2", 50, 1) **returns HIGH**

Parameters

dopt is Date of Plan Termination
dob is participant date of birth
dote is date of termination of employment
ishut is indicator of plant shutdown within one year before *dopt* (Y or N)
iquit is indicator of whether participant must quit to retire (Y or N)
noit is indicator of Notice of Intent to Terminate filed on or after 04/01/1981 (Y or N)
retstat is Retirement Status as of *dopt* ("1", "2", "3", or "4")
eura is Participant Earliest Unreduced Retirement Age
gmbnra_vb_vbnf is one of GMBNRA, VB, or VBNF

Error

ishut, *iquit*, *noit* has values other than "Y" or "N"
gmbnra_vb_vbnf <=0
dopt <=01/01/1974 or > 12/31/1993
retstat has values other than "1","2","3","4"
dob > *dopt* or *dob* > *dote*
dob, *dote*, *dopt* <= 0 or > 12/31/2099

Note See details in Actuarial Technical Manual from Section IV.G.

XRA2

04/27/2017

The XRA2 function returns the valuation retirement age for pre-DOPT retirees and beneficiaries and the expected retirement age for individuals still deferred at DOPT.

Format

XRA2(*bl, era, nra, DOPT, DOB, SDOB, retstat, id, foma, Anniv, DOP*)

Return

For pre-DOPT retirees and beneficiaries, returns the valuation retirement age (age nearest birthday at DOPT) and for individuals still deferred at DOPT, returns the expected retirement age. If the earliest unreduced retirement age is before DOPT, the function returns the age nearest birthday at DOPT.

Example

=XRA2("IMM", 50, 65, DATE(2013,06,15), DATE(1959,06,01), DATE(1959,12,25), "2", "2", 0), **returns 54**

=XRA2("IMM", 50, 65, DATE(2013,06,15), DATE(1959,06,01), DATE(1959,06,01), "2", "2", 1), **returns 55**

=XRA2("LOW", 60, 65, DATE(2009,01,01), DATE(1950,05,15), DATE(1956,01,22), "2", "1", " "), **returns 63**

=XRA2("HIGH", 55, 65, DATE(2009,01,01), DATE(1943,06,01), DATE(1944,01,22), "2", "1", " "), **returns 66**

Parameters

bl is benefit level ("LOW", "MED", "HIGH", "IMM", "NA")
era is earliest retirement age
nra is earliest unreduced retirement age
DOPT is date of plan termination
DOB is participant date of birth
SDOB is spouse date of birth
retstat is record status as of DOPT ("1" - in-pay at DOPT, "2" - separated vested, "3" - active vested, "4" - non-vested)
id is type of record ("1" - participant, "2" - beneficiary)
foma (optional) flag for first of month after; default=0. This parameter is referenced for calculating the earliest reduced and unreduced retirement date:

0 - first of month on or following
1 - first of the month following
2 - first of the month on or before
3 - plan anniversary nearest
4 - first of the month closest

Anniv (optional) – must be populated with the plan anniversary when the *foma* parameter is set to 3. The plan anniversary should be entered as MMDD, e.g., "0301" for a March 1 plan anniversary.
DOP (optional) – must be populated when the participant's date of participation with the *foma* parameter is set to 3. When the *foma* parameter is set to 3, the function computes the earliest unreduced retirement date as the earlier of the plan anniversary closest to the date at which the participant attains the earliest unreduced retirement age and the later of the first of the month on or following the participant's 65th birthday and the fifth anniversary of the date of participation.

Note ID = '4'(Alternative Payee) is not supported for the ID parameter because the expected retirement date for an alternate payee record that is deferred at DOPT is equal to the expected retirement date for the participant (assuming the participant was also deferred at DOPT). Therefore, the user should compute the expected retirement age and expected retirement date for the participant using the BL, XRA2, and XRD2 functions and then use the SXRA2 function to compute the expected retirement age for the alternate payee. The expected retirement age for the alternate payee should be stored in the XRA field in the alternate payee record (ID = '4').

Error

id = "2" and *retstat* = "3", "4"
DOB <= 0 or > 12/31/2099
DOB > *DOPT*
max(*anb*, *era*) is > *eura* or > 80 or < 40 while *bl* ="LOW", "MED", "HIGH".
eura > 80 or < 40 while *bl* ="LOW", "MED", "HIGH".
max(*DOPT*, *era*) < 30
max(*DOPT*, *era*) > 80
max(*DOPT*, *era*) > *nra*
nra > 80
nra < 40

bl is not one of "NA", "IMM", "LOW", "MED", "HIGH".
SDOB = 0 when *id* ="2"
bl = "NA" while *retstat* is not "1" or vice versa.
foma parameter is not 0, 1, 2, 3, or 4.
Anniv parameter is not populated when *foma* is set to 3 or is populated when *foma* parameter is not set to 3.
Anniv parameter does not contain a valid MMDD entry (e.g., 0230).
DOP parameter is not populated when *foma* is set to 3 or is populated with *foma* parameter is not set to 3.
DOP is before *DOB* or after *DOPT*.

Note XRA2 function replaces the XRA function and has been enhanced to correctly calculate the valuation age for pre-DOPT retirees and beneficiaries, to handle scenarios where the earliest unreduced retirement age is before DOPT, and to include the foma *parameter so that the user can specify first of the month following instead of first of the month on or following (default) in the computation of the earliest reduced and unreduced retirement dates (the* foma *parameter now includes additional options as detailed above).*

XRD2

02/26/2016

Format

XRD2(*retstat, dopt, bderd, xra, dob, foma, Anniv, dop*)

Return

Expected Retirement Date

For a retiree, XRD2 is always set to the 1st of the month on or after *dopt*.

For all other participants, XRD2 is always set to *bderd* when *xra* is the age nearest birthday at *dopt*. If *xra* is after the age nearest birthday at *dopt*, XRD2 is set to the first of the month on or following *xra*th birthday when *foma* = 0, and XRD2 is set to the first of the month following *xra*th birthday when *foma* = 1, and XRD2 is set to the first of the month on or before *xra*th birthday when *foma* = 2, and XRD2 is set to the first of the month closest to the *xra*th birthday when *foma* = 4. When *foma* = 3, the following procedure is used to determine XRD2:

i) Compute the age nearest birthday at *dopt*;

ii) Compute the plan anniversary closest to the *xra*th birthday (limited to later of first of the month on or following *dopt* and the first of the month on or following 65th birthday and the fifth anniversary of *dop*);

iii) Compute the later of the date computed in ii and the first of the month on or following *dopt*;

iv) If the value entered in the *bderd* parameter is greater than the value computed in iii, error code 2102 is returned;

v) If the value entered in the *xra* parameter is equal to the age computed in i, the value entered in the *bderd* parameter is returned;

vi) If the value entered in the *bderd* parameter is equal to the date computed in iii, that date is returned;

vii) If the value entered in the *bderd* parameter is less than the value computed in iii, the first of the month on or following the *xra*th birthday is returned.

Example

=XRD2("2", DATE(2005, 06, 01), DATE(2005, 06, 01), 64, DATE(1941, 04, 15), 1) **returns 06/01/2005 or 38504**.

=XRD2("2", DATE(2012,06,15), DATE(2014,03,01),60, DATE(1959,02,28),1) **returns 03/01/2019 or 43525**.

Parameters

retstat is participant status as of *dopt*
dopt is date of plan termination
bderd is participant's earliest retirement date
xra is participant's expected retirement age
dob is participant date of birth
foma is first of the month indicator:

0 - first of month on or following
1 - first of the month following
2 – first of the month on or before
3 – plan anniversary nearest
4 - first of the month closest

Anniv (optional) – must be populated with the plan anniversary when the *foma* parameter is set to 3. The plan anniversary should be entered as MMDD, e.g., "0301" for a March 1 plan anniversary.
dop (optional) – must be populated with the participant's date of participation when the *foma* parameter is set to 3.

Error

dob <= 0 or > 12/31/2099 or > *dopt*
retstat is not one of "1", "2", "3", "4"
Invalid *dopt*, *dob*, *bderd*
foma is not one of 0, 1, 2, 3, or 4.
dopt < 01/01/1974
retstat = "1" and *bderd* is not equal to first of the month on or following *dopt*.
retstat <> "1" and *bderd* is a date before the first of the month on or following *dopt*.
retstat <> "1" and *foma* = 0 and *bderd* is a date after the later of the first of the month on or following the *xra*th birthday and the first of the month on or following *dopt*.
retstat <> "1" and *foma* = 1 and *bderd* is a date after the later of the first of the month following the *xra*th birthday and the first of the month on or following *dopt*.
retstat <> "1" and *foma* = 2 and *bderd* is a date after the later of the first of the month on or before the *xra*th birthday and the first of the month on or following *dopt*.

retstat <> "1" and *foma* = 3 and *bderd* is a date after the later of the plan anniversary closest to the *xra*th birthday and the first of the month on or following *dopt*.
retstat <> "1" and *foma* = 4 and *bderd* is a date after the later of the first of the month closest to the *xra*th birthday and the first of the month on or following *dopt*.
retstat = "1" and *xra* <> anb at *dopt*
retstat <> "1" and *xra* not equal to an integer value >= to the anb at *dopt*.
Anniv parameter is not populated when *foma* is set to 3 or is populated when *foma* parameter is not set to 3.
Anniv parameter does not contain a valid MMDD entry (e.g., 0230).
dop parameter is not populated when *foma* is set to 3 or is populated with *foma* parameter is not set to 3.
dop is before *dob* or after *dopt*.

SXRA2

02/26/2016

Note The SXRA2 function enhances the SXRA function and corrects the scenarios where the function did not return the appropriate values.

Format

SXRA2 (*retstat, dopt, Val_sdob, xrd, pl_erd*)

Return

For pre-DOPT retirees/beneficiaries, it returns the age nearest birthday of the beneficiary at DOPT (not the first of the month following DOPT). For participants still deferred at DOPT, SXRA2 is either the age nearest birthday at XRD or the age nearest birthday at DOPT.

Example

=SXRA2("1", DATE(2012,6, 15), DATE(1949, 12,20), DATE(2012,7,1), DATE(2011, 7, 1)) **returns 62**

Parameters

retstat is participant status as of *dopt*
dopt is date of plan termination
val_Sdob is the valuation spouse date of birth
xrd is expected retirement date
pl_erd is the participants' earliest retirement date

Error

retstat <> "1", "2", "3" or "4"
retstat is missing
dopt < 1/1/1974
dopt is missing
Val_Sdob > *dopt*
Val_SDOB > *XRD* (also greater than *DOPT*)
XRD Not on First of Month
retstat <> '1' and *dopt* > *xrd*
pl_erd > *xrd*

Salary Estimation Functions

09/28/2017

SEST_2

09/28/2017

Format

SEST_2(*year_of_est, range1, salyrind, reversesalaries*)

Return

The ASD Standard Estimation of Missing Salary for *year_of_est*. The missing salary is estimated by multiplying the closest actual salary known by the ratio of the national wage average for the year being estimated to the national wage average for the year of the actual salary used.

Note To estimate a missing salary between two known salaries, the function decreases the later known salary rather than increasing the earlier known salary. For salary estimations precedent to the first available actual Annual Compensation Data, the first known salary data subsequent to the missing salary will be used in estimation. For salary estimations subsequent to the last available actual Annual Compensation data, the last actual Annual Compensation data will be used in estimation.

Note If salary is known for the year of estimation, SEST_2 will return that known salary data.

Note The SEST_2 function considers the salary data as missing for a year if the cell associated with that year is empty. For example, if the input in the range1 parameter is AA2:AE2, the input in the salyrind *parameter is 2015, and the input in the* reversesalaries *parameter is 1, the SEST_2 function will consider the salary for 2014 to be missing if AD2 is empty. If AD2 is actually populated with $0.00, the SEST_2 function will consider the $0.00 as the actual salary for 2014 to be used in the calculation. Therefore, if the salary is actually missing for a year, it is important that the cell for that year be left empty and not populated with $0.00; otherwise, a salary will not be estimated for that year and instead $0.00 will be used as the salary for that year.*

Note Missing earnings can only be estimated for years from 1951 up to the latest year for which the national average wage has been published and added to the ATPBGC database. The national average wage for a particular year is published toward the end of the following calendar year, e.g., the national average wage for 2014 was published at the end of 2015. Therefore, if the function is being used in the middle of 2016 to perform an estimation of earnings (before the national average wage is published for 2015), missing earnings can only be estimated for years up to 2014. Contact TRMD if there is a need to be able to have the function estimate earnings for a year that is after the last year for which the national average wage has been published, as an estimated national average wage value can be added to the ATPBGC database for use by the function until a final value is published (TRMD will replace the estimated national average wage values added to the ATPBGC database with the final published values at which point the function may return a different result than the result obtained before the update).

Note See details in Section II.C.1 of the Actuarial Technical Manual. This function does not follow exactly the procedure detailed in this section of the ATM and instead determines the estimated salary for the year specified by multiplying the actual earnings from the applicable year by a ratio of National Average Wage Earnings values.

Example

=SEST_2(1978, SALARIES, 1970) **returns 44365.69**, where SALARIES = 26000, 25000, 24000, 23000

Parameters

year_of_est is 4-digit year for which salary needs to be estimated (this cannot be later than the last year for which an actual or estimated national average wage has been added to the ATPBGC database).
salaries is a 1-sheet, 1-row range of consecutive salaries which the estimation will be based on. The *salaries* data must be setup from latest to earliest if the *reversesalaries* parameter is set to 0 or not populated and should be setup from earliest to latest if the *reversesalaries* parameter is set to 1.
salyrind is a 4-digit year for the latest year of earnings in the range entered in the *salaries* parameter. This will be the year for the first cell in the range when the *reversesalaries* parameter is set to 0 or not populated and will be the year for the last cell in the range when the *reversesalaries* parameter is set to 1.
reversesalaries is an optional parameter that specifies whether the salary data is ordered (left to right) from latest to earliest (populate with 0) or earliest to latest (populate with 1). For example, if the salary data is ordered from 2005 to 2000, the parameter is populated with 0 or not populated and if the salary data is ordered from 2000 to 2005, the parameter is populated with 1. The default value is 0 or latest to earliest.

Error

salaries has more than 200 columns (more than 200 salaries)
salaries has more than one row
salaries has no positive data
year_of_est < 1951
year_of_est > the last year for which an estimated or actual national average wage has been added to the ATPBGC database.
salryind < 1951
The actual earnings to be used in the calculation is for a year after the last year for which an estimated or actual national average wage has been added to the ATPBGC database.
reversesalaries is not 0 or 1

Note This function replaces the previous SEST function, which should no longer be used. The SEST function will continue to work for older spreadsheets on Archive. The previous SEST function had an additional DOPT parameter between the salyrind *parameter and the* reversesalaries *parameter.*

SESTAVG_2

04/27/2017

Format

SESTAVG_2(*year_of_est, salavg, yearfrst, yearlast, planmonth, estype, intype*)

Return

The ASD Standard Salary Estimation for *year_of_est* based on participant's average compensation. This estimate for each of the calendar/plan year salaries uses Participant's Average Annual Compensation over a set of consecutive calendar/plan years. The estimate is made using the participant's average compensation as calculated over the specified period of years, and the assumption that the participant's

compensation changes progressed in accordance with changes in National Average Annual Earnings during the specified period of years.

Note The use of this function is appropriate only in cases where no other compensation data is available for the participant. If the Average Annual Compensation supplied is described in the plan as the average of the highest x years of salary earned during a period of y years (x < y), then assume that the highest salaries were earned during the final x consecutive years of the y-year period.

Note See details in Section II.C.2 of the Actuarial Technical Manual. Also see the note that follows the SEST_2 function about requesting to have an estimated national average wage added to the ATPBGC database if there is a need to perform an estimate using a year that is later than the last actual national average wage value currently in the ATPBGC database.

Example

=SESTAVG_2(1989, 15700, 1980, 1988, 1, "CLN", "CLN") **returns 19709.58**

Parameters

year_of_est is 4-digit year for which salary needs to be estimated (this cannot be later than the last year for which an actual or estimated national average wage has been added to the ATPBGC database.)
salavg is the participant's average compensation over consecutive years from *yearfrst* to *yearlast*
yearfrst is the 4-digit first plan year *salavg* is based on
yearlast is the 4-digit last plan year *salavg* is based on
planmonth is the month where plan year begins. It should be from 1 through 12 (representing January - December)
estype indicates if salary estimation is for calendar year or plan year
estype ="CLN" indicates calendar year; *estype*="PLN" indicates plan year
intype indicates if input average is over calendar year or plan year
intype ="CLN" indicates calendar year; *intype*="PLN" indicates plan year

Note A calendar year is a plan year with planmonth =1

Error

salavg < 0
Any of the 3 years in the parameter list is before 1951
Any of the 3 years on the parameter list after the last year for which an estimated or actual national average wage has been added to the ATPBGC database.
yearfrst > *yearlast*
planmonth is other than 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
estype/intype is other than "CLN", "PLN"

Note This function replaces the previous SESTAVG function, which should no longer be used. The SESTAVG function will continue to work for older spreadsheets on Archive. The previous SESTAVG function had an additional DOPT parameter between the yearlast *parameter and the* planmonth *parameter.*

Form Conversion Factors

09/24/2018

CCF

02/26/2016

Format

CCF(*monthsCertain*)

Return

The PBGC form conversion factor for a SLA to a ##C&C annuity (for the *monthsCertain*).

Note A non-integer entry in this parameter will be used without any rounding. For example, an entry of 15 will generate a different result than 15.25.

Example

=CCF(120) **returns .9250**

=CCF(60) **returns .9750**

Parameters

monthsCertain is a number of months >= 0 in the certain period for the annuity

Note See details in Actuarial Technical Manual from Section IV.A.3.a.

PBGCJSF

02/26/2016

Note This function replaces the functionality of JFS and JFS2.

Format

PBGCJSF(*participantAge, spouseAge, J&Spercent*)

Return

The PBGC form conversion factor for a SLA to a J&S annuity (for the *participantAge* and *spouseAge* at the *J&Spercent*)

PBGCJSF allows the survivor percentages greater than 1 and less than 50 and a new methodology is established which involves a ratio of NPVF Values.

Example

=PBGCJSF(78, 69, 2.2) **returns .4965**

=PBGCJSF(68, 72, 1.9) **returns .7102**

Parameters

participantAge is the participant's age nearest birthday at the actual retirement date
spouseAge is the spouse's age nearest birthday at the actual retirement date
J&Spercent is the survivor percent expressed as a decimal

Error

Invalid *participantAge*, *spouseAge*, *J&Spercent*
participantAge <= 0 or *participantAge* > 125
spouseAge <= 0 or *spouseAge* > 125
J&Spercent < 0 and *J&Spercent* >= 50

PBGCBFCF2

02/26/2016

Note This function is an enhancement to PBGCBFCF and accommodates: (i) conversion form SLA to J&25%S, (ii) the age difference between the participant and spouse is over 35, (iii) greater than 1.00 for conversion from SLA to J&S under some circumstances.

Format

PBGCBFCF2(*from_code, from_spc, from_mths, to_code, to_spc, to_mths, ara, sara*)

Return

The PBGCBFCF2 function returns the Form Conversion Factor. Eligible forms are: Straight Life Annuity (SLA), Joint and Survivor Annuity (Contingent Basis) (J&p%S (contingent basis)), Joint and Survivor Annuity (Joint Basis) (J&p%S (joint basis p >= 50%)), J&p%S with Certain and Continuous Annuity (Nc&C (contingent basis)), Certain and Continuous Annuity (nC&C) and n year Certain. Also J&S Popup, J&S Popup with Certain, and Non-Traditional J&S with Certain.

The PBGCBFCF2 allows the survivor percentages greater than 1 and less than 50 when the annuity form is equal to "JSC".

PBGCBFCF2 limits the form conversion factor to 1.0 whenever the from_code parameter is equal to “SLA” and the to_code parameter is equal to “JSC” or “SLA”.

When contingent annuitant is more than 35 years younger than primary annuitant and when from_code or to_code is equal to “JSC or “JSJ”, the age adjustment factor should be modified to use the correct calculation. This can be obtained by using the following formula:

0.725 – (0.005 x years younger in excess of 35)

When contingent annuitant is more than 35 years older than primary annuitant and when from_code or to_code is equal to “JSC” or “JSJ”, the age adjustment factor should be modified to use the correct calculation. This can be obtained by using the following formula:

1.1375 – (0.0025 x years older in excess of 35)

Example

=PBGCBFCF2("SLA", 0, 0, "JSC", 0.5, 0, 51, 53) **returns 0.8872**

Parameters

from_code
from_spc is secondary annuitant percent in from benefit form
from_mths is original number of months certain in from benefit form

Note If the from_code *parameter is populated with "SLA", a non-integer entry in this parameter will be used without any rounding but otherwise a non-integer entry is first rounded by the function before calculating the from factor (denominator in ratio of factors). For example, when the* from_code *parameter is set to "SLA", an entry of 15 will generate a different result than 15.25; however, when the* from_code *parameter is set to something other than "SLA", an entry of 15 and 15.25 will generate the same result as the function will round the 15.25 entry to 15 before making the calculation.*

to_code
to_spc is secondary annuitant percent in to benefit form
to_mths is original number of months certain in to benefit form

Note If the to_code *parameter is populated with "SLA", a non-integer entry in this parameter will be used without any rounding but otherwise a non-integer entry is first rounded by the function before calculating the to factor (numerator in ratio of factors). For example, when the* to_code *parameter is set to "SLA", an entry of 15 will generate a different result than 15.25; however, when the* to_code *parameter is set to something other than "SLA", an entry of 15 and 15.25 will generate the same result as the function will round the 15.25 entry to 15 before making the calculation.*

ara is participant's actual retirement age
sara is spouse/beneficiary's age at participant's actual retirement date

Suggested Input

To get SLA, input code="SLA", spc=0, mths=0;
To get nC&C, input code="SLA", spc=0, mths=n;
To get J&S(contingent basis), input code="JSC", nonzero spc, mths=0.
To get J&S (joint basis), input code="JSJ", nonzero spc, mths=0.
To get J&S C&C (contingent basis), input code="JSC", nonzero spc and mths.
To get J&S Non-Traditional C&C (contingent basis), input code="JSN", nonzero spc and mths.
To get J&S Pop-up, input code="JSP", nonzero spc and mths=0.
To get J&S Pop-up C&C, input code="JSP", nonzero spc and mths.
To get n year Certain, input code="CTN", spc=0 and mths=n.

Error

from_code is not one of "SLA", "JSC", "JSJ", "JSN", "JSP" or "CTN"
to_code is not one of "SLA", "JSC", "JSJ", "JSN", "JSP" or "CTN"
from_code = “JSN” or "JSP" and *from_spc* < 0.5 or *from_spc* > 1
to_code = “JSN” or "JSP" and *to_spc* < 0.5 or *to_spc* > 1
from_code = “JSJ” and *from_spc* > 1
to_code = “JSJ” and *to_spc* > 1
from_code = “JSN” and *from_mths* > 120
to_code = “JSN” and *to_mths* > 120
from_code = “JSJ” and *from_mths* > 0
to_code = “JSJ” and *to_mths* > 0
from_code = “JSC” or “JSJ” and *from_spc* = 0
to_code = “JSC” or “JSJ” and *to_spc* = 0
from_code = “CTN” and *from_mths* = 0
to_code = “CTN” and *to_mths* = 0
ara < 0, *sara* < 0
from_spc < 0 and *from_spc* >= 50
from_mths < 0
to_spc < 0 and *to_spc* >= 50
to_mths < 0

PBGCBFCPPA

03/29/2018

Note The PBGCBFCFPPA function is an improved and more robust version of the existing PBGCBFCF2 function. It includes several enhancements that make it easier to use and will help avoid mistakes that are sometimes made with the PBGCBFCF2 function when computing a form conversion factor for the MIL. The rules for how to populate the parameters for this function are different than the rules for populating the parameters for the PBGCBFCF2 function, so it is important to understand the differences in these rules (populating the parameters for the PBGCBFCFPPA function using the rules for the PBGCBFCF2 function may lead to invalid results). The factor produced by the PBGCBFCFPPA function is only to be used for computing the MIL. To convert a plan benefit one form of annuity to another, continue to use PBGCBFCF2 (assuming PBGC form conversion factors are being used to make the conversion).

Format

PBGCBFCFPPA(*DOPT, BPD, XRD, DOB, DOD, SDOB, SDOD, BDOB, BDOD, Nonspind, FORM, SPCT, Mths2, RETSTAT, ID, CertainBen, LevelizedBen, SurvivorBen*)

Return

The benefit form conversion factor for computing the Maximum Insurance Limit.

The PBGCBFCFPPA function returns the benefit form conversion factor for computing the MIL based on the inputs provided by the user. The function handles many types of annuity forms. Contact TRMD if the plan benefit form of annuity is not covered by the function so an assessment can be conducted to determine if the function should be modified to handle the form of annuity in the plan.

PBGCBFCFPPA allows survivor percentages that are greater than 1 and less than 50 when the annuity form = "JSC" or "JSP" and limits the form conversion factor to 1.0 when annuity form = "JSC", "JSP", "JSN", or "SLA". PBGCBFCFPPA supports the annuity forms of "CTN", "JSN", and "JSP" in addition to the annuity forms of "SLA", "JSC", and "JSJ".

When contingent annuitant is more than 35 years younger than primary annuitant and when form is equal to "JSC", "JSP", "JSN" or "JSJ", the age adjustment factor is determined using the following formula:

0.725 - 0.005 x years younger in excess of 35)

When contingent annuitant is more than 35 years older than primary annuitant and when form is equal to "JSC", "JSP", "JSN" or "JSJ", the age adjustment factor is determined using the following formula:

1.1375 + (0.0025 x years older in excess of 35)

PBGCBFCFPPA will use "JSP" in the *FORM* parameter to identify J&50%S pop-up annuity and calculate the benefit. The steps to calculate the form conversion factor are provided in the Actuarial Technical Manual.

Example

=PBGCBFCFPPA(DATE(2015,06,15), DATE(2013,06,15), DATE(2010,06,01), DATE(1950,05,01), 0, DATE(1954,05,01), 0, 0, 0, "N", "JSC", 0.50, 0, "1", "1") **returns 0.8640**

=PBGCBFCFPPA(DATE(2015,06,15), DATE(2013,06,15), DATE(2014,06,01), DATE(1950,05,01), DATE(2014,07,01), DATE(1954,05,01), 0, 0, 0, "N", "JSC", 0.50, 120, "1", "2") **returns 0.9250**

=PBGCBFCFPPA(DATE(2015,06,15), DATE(2013,06,15), DATE(2020,06,01), DATE(1960,05,01), 0, 0, 0, 0, 0, "N", "SLA", 0, 120, "2", "1") **returns 0.9250**

Parameters

DOPT is Date of Plan Termination.
BPD is Bankruptcy Petition Date—populated only when the plan terminates while in bankruptcy (enter 0 or reference a blank cell when BPD does not apply). The date entered in this parameter must be on or after 09/16/2006 and before the date entered in the *DOPT* parameter.
XRD is Participant/AP's Actual or Expected Date of Retirement—must be on or before date entered in the *DOPT* parameter if "1" is entered in the *RETSTAT* parameter and must be on or after the first of the month on or following the date entered in the *DOPT* parameter if a value other than "1" is entered in the *RETSTAT* parameter (for a beneficiary record where the beneficiary is receiving a QPSA benefit because the participant died before retiring, *XRD* should be populated with the commencement date of the QPSA benefit but otherwise *XRD* should be populated with the commencement date of the participant's benefit).
DOB is Participant/AP's date of birth—must be before date entered in *DOPT*, *BPD*, *XRD*, and *DOD* parameters.
DOD is participant/AP's date of death—if date entered in *DOPT* parameter is on the first of the month, must be before date entered in *DOPT* parameter if "2" is entered in the *ID* parameter and must be on or after date entered in *DOPT* parameter if "1" or "4" is entered in the *ID* parameter, and if date entered in *DOPT* parameter is not on the first of the month, must be on or before date entered in *DOPT* parameter if "2" is entered in the *ID* parameter and must be after date entered in *DOPT* parameter if "1" or "4" is entered in the *ID* parameter.
SDOB is Spouse's Date of Birth—must be before date entered in *XRD*, *DOD*, and *SDOD* parameters.
SDOD is Spouse's Date of Death—must be on or after date entered in *XRD* parameter.
BDOB is Beneficiary's Date of Birth—must be before date entered in *XRD*, *DOD*, and *BDOD* parameters.
BDOD is Beneficiary's Date of Death—must be on or after date entered in *XRD* parameter.

Nonspind is Non-Spouse Beneficiary Indicator—must be equal to "Y" or "N".
FORM is Participant/AP's Form of Annuity Code—even if a beneficiary record.
SPCT is Participant/AP's Survivor Percentage—must be entered as a decimal value that is greater than or equal to 0 and less than 50.

Note This is 50 and not 0.50.

Mths2 is Participant/AP's Months Certain—must be greater than or equal to 0 and less than 1230.

Note If the FORM *parameter is populated with "SLA", a non-integer entry in the* Mths2 *parameter will be used without any rounding, but otherwise a non-integer entry is first rounded by the function before calculating the form conversion factor for the maximum insurance limit. For example, when the* FORM *parameter is set to "SLA", an entry of 15 will generate a different result than 15.25; however, when the* FORM *parameter is set to something other than "SLA", an entry of 15 and 15.25 will generate the same result as the function will round the 15.25 entry to 15 before performing the calculation.*

RETSTAT is the retirement status at *DOPT*—must be "1", "2", "3", or "4".
ID is the record type (participant, beneficiary, or alternate payee)—must be "1", "2", or "4".
CertainBen is the amount of the benefit that is paid for the balance of the certain period if the primary annuitant dies before the certain period expires. It can be smaller or larger than the levelized benefit. The function will adjust the factor applied for the certain period if the value in the *CertainBen* is not equal to the value in the *LevelizedBen* parameter.
LevelizedBen is the amount of the levelized benefit. This parameter must be populated if either the *CertainBen* or *SurvivorBen* parameters are populated.
SurvivorBen is the amount of the survivor benefit paid to the contingent annuitant if the primary annuitant dies first. It can be smaller or larger than the levelized benefit. The function will adjust the survivor percentage if the value in the *SurvivorBen* parameter is not equal to the value in the *LevelizedBen* parameter.
See examples 33 and 34 in IV.R. Examples of Calculating Monthly Benefits Guaranteed by PBGC in the ATM for additional information on the purpose of the last three optional parameters.

Possible Inputs for Form of Annuity

To get SLA for participant/AP, FORM = "SLA", SPCT = 0, Mths2 = 0
To get SLA for beneficiary, FORM = "JSC", SPCT = 0.50, Mths2 = 0
To get nC&C for participant/AP, FORM = "SLA", SPCT = 0, Mths2 = n
To get nC&C for beneficiary, FORM = "JSC", SPCT = 0.50, Mths2 = n
To get J&n%S for participant (contingent basis), FORM = "JSC", SPCT = n, Mths2 = 0
To get J&n%S for participant (joint basis), FORM = "JSJ", SPCT = n, Mths2 = 0
To get Traditional J&n%S with mCertain for participant (contingent basis), FORM = "JSC", SPCT = n, Mths2 = m
To get Non-Traditional J&n%S with mCertain for participant (contingent basis), FORM = "JSN", SPCT = n, Mths2 = m

Note Populate the FORM*,* SPCT*, and* Mths *parameters based on the participant/AP's original form of annuity. For a participant who commenced his/her benefit before dying, this is the form of annuity for the participant's benefit even if the participant died before DOPT (i.e., ID = '2'). For a participant who died before retiring and before DOPT (i.e., ID = '2' and beneficiary is receiving a QPSA benefit) this is the joint-life form of annuity upon which the QPSA is based, which is generally the same as the QJSA. User guidance for populating these three parameters is provided in the next three notes.*

Note FORM *parameter:*

If RETSTAT = '1' and ID = '1' or '4' enter value in FORM_CODE_ARD

If RETSTAT = '1' and ID = '2' and DOR < DOD enter value in FORM_CODE_PTP

If RETSTAT = '1' and ID = '2' and DOR ≥ DOD enter value in FORM_CODE_PTP_QPSA

If RETSTAT ≠ '1' and ID = '1' or '4' and CALC_INDICATOR = 'V' enter value in FORM_CODE

If RETSTAT ≠ '1' and ID = '2' and CALC_INDICATOR = 'V' enter value in FORM_CODE_PTP_QPSA

If RETSTAT ≠ '1' and CALC_INDICATOR = 'R' enter value in FORM_CODE (Runtime will populate the FORM_CODE field correctly)

The fields FORM_CODE_ARD, FORM_CODE_PTP, FORM_CODE_PTP_QPSA and FORM_CODE contain single character codes '1', '2', '3', '4', '5', '6', '7', '8', '9', '0', 'A', 'B', 'C', 'D', 'E', 'F', 'G', or 'H'. These codes need to be translated into one of the valid values that can be entered in the FORM parameter. For example, a code of '9' translates to 'JSC', a code of '0' translates to 'JSP', a code '2' translates to 'SLA', etc.

Note SPCT *parameter:*

If RETSTAT = '1' and ID = '1' or '4' enter value in SPC_ARD

If RETSTAT = '1' and ID = '2' and DOR < DOD enter value in SPC_PTP

If RETSTAT = '1' and ID = '2' and DOR ≥ DOD enter value in SPC_PTP_QPSA

If RETSTAT ≠ '1' and ID = '1' or '4' and CALC_INDICATOR = 'V' enter value in SPC_VAL

If RETSTAT ≠ '1' and ID = '2' and CALC_INDICATOR = 'V' enter value in SPC_PTP_QPSA

If RETSTAT ≠ '1' and CALC_INDICATOR = 'R' enter value in SPC_VAL (Runtime will populate the SPC_VAL field correctly)

Note Mths2 *parameter:*

If RETSTAT = '1' and ID = '1' or '4' enter value in MTHS_ARD

If RETSTAT = '1' and ID = '2' and DOR < DOD enter value in MTHS_PTP

If RETSTAT = '1' and ID = '2' and DOR ≥ DOD enter value in MTHS_PTP_QPSA

If RETSTAT ≠ '1' and ID = '1' or '4' and CALC_INDICATOR = 'V' enter value in MTHS

If RETSTAT ≠ '1' and ID = '2' and CALC_INDICATOR = 'V' enter value in MTHS_PTP_QPSA

If RETSTAT ≠ '1' and CALC_INDICATOR = 'R' enter value in MTHS (Runtime will populate the MTHS field correctly)

Note The original date of retirement may not be known for all records with RETSTAT = '1'. A value must still be entered for the XRD parameter. The date entered can impact the result of the calculation. For example, if the date entered is between BPD *and* DOPT*, the age at the date entered in the* XRD *parameter is used—whereas if the date entered is before* BPD*, the age at the date entered in the* BPD *parameter is used.*

Also, the participant's original form of annuity may not be known for all records with RETSTAT = '1' and ID = '2'. Values for the participant form of annuity must still be entered for the FORM*,* SPCT*, and* Mths2 *parameters. For example, if the beneficiary is receiving an SLA, the* FORM *parameter should be populated with JSC and the* SPCT *parameter should be populated with a value greater than 0 (the actual percentage is not important).*

Note A beneficiary can be receiving a non-level survivor benefit that came from a traditional joint life annuity with a certain period.

The survivor benefit payable to the beneficiary is paid at the original amount payable to the participant until the certain period

expires and then drops to the survivor benefit amount. In order to apply the MIL, the beneficiary's benefit must be levelized and the levelized benefit will be an amount less than the benefit payable if the beneficiary dies before the end of the certain period. If the FORM *parameter is populated with "JSC" and the* SPCT *parameter is populated with "0.50" and the* Mths2 *parameter is populated with "120" and certain period is not expired at* DOPT*, the function will return a form conversion factor for a level C&C benefit that can be used to compute the MIL. It is necessary to levelize the beneficiary benefit by first converting the extra certain benefits to a temporary SLA (using plan AEQ) before applying the PBGC level life factors and then convert the levelized amount back to a C&C.*

Error

FORM is not one of "SLA", "JSC", "JSJ", "CTN", "JSN" or "JSP"
Invalid *DOPT, BPD, XRD, DOB, DOD, SDOB, SDOD, BDOB*, or *BDOD*
BPD > *DOPT* or *BPD* < 09/16/2006
XRD < *DOPT* for *RETSTAT* ≠ "1" or *XRD* > *DOPT* for *RETSTAT* = "1"
SPCT < 0 or ≥ 50
DOB > (*DOPT, BPD, XRD*, or *DOD*)
SDOB > (*XRD*, *DOD*, or *SDOD*)
BDOB > (*XRD*, *DOD*, or *BDOD*)
DOD < *DOPT* for *ID* = "1"or "4" or *DOD* >*DOPT* for *ID* = "2"
SDOD < *XRD*
BDOD < *XRD*
DOPT < 01/01/1974
Mths2 > 1230
FORM = "JSN" and *SPCT* < 0.5 and *SPCT* > 1
FORM = "JSJ" and *SPCT* > 1
FORM = "JSN" and *Mths2* > 120
FORM = "CTN" and *Mths2* = 0
Attained age at *XRD* is < 0
RETSTAT = 1 with attained age at *DOPT* < 0
SPCT or *Mths2* is not numeric
Nonspind is not "Y" or "N"
RETSTAT is not "1", "2", "3", or "4"
ID is not "1", "2", or "4"
LevelizedBen is not populated with either *CertainBen* or *SurvivorBen* populated.

BFCFAEQ

09/24/2018

Format

BFCFAEQ(*FromBftForm, FromSurvPct, FromMthsCert, FromMthsTemp, ToBftForm, ToSurvPct, ToMthsCert, ToMthsTemp, PXRAge, SXRAge, Psex, Ssex, XBRD, MMortality, FMortality, AnnuityType, Method, PHSorPY, MGEN, FGEN, TableInd, DOPT*)

Return

The actuarially equivalent benefit form conversion factor calculated using the inputs provided.

Example

=BFCFAEQ("SLA",0,0,0,"JSC",0.5,0,0,65,61,"M","F",0.06,"LS00SU2015","LS00SU2015","MP","N") **returns 0.9112**

Parameters

FromBftForm
FromSurvPct is the contingent annuitant percent in "from" benefit form.
FromMthsCert is the original number of months certain in "from" benefit form.
FromMthsTemp is the original number of months temporary in "from" benefit form.
ToBftForm
ToSurvPct is the contingent annuitant percent in "to" benefit form.
ToMthsCert is the original number of months certain in "to" benefit form.
ToMthsTemp is the original number of months temporary in "to" benefit form.
PXRAge is the primary annuitant's age at XRD/DOR.
SXRAge is the contingent annuitant's age at XRD/DOR (used only if "from" or "to" form of annuity is joint life).
Psex is the primary annuitant's gender.
Ssex is the contingent annuitant's gender (used only if "from" or "to" form of annuity is joint-life).
XBRD
Mmortality
Fmortality
AnnuityType (optional)
Method (optional)
PHSorPY (optional)
MGEN (optional)
FGEN (optional)
TableInd (optional)
DOPT (optional)

Error

FromBftForm or *ToBftForm* not equal to "SLA", "CTN", "JSC", "JSJ", "JSN", or "JSP".
FromSurvPct or *ToSurvPct* less than 0 or greater than or equal to 50.
FromMthsCtn or *ToMthsCtn* less than 0 or large enough that the certain period goes beyond final age in the mortality table.
FromMthsTemp or *ToMthsTemp* less than 0 or large enough that the temporary period goes beyond final age in the mortality table.
PXRAge or *SXRAge* less than 0 or greater than 124.
Psex or *Ssex* not equal to "M" or "F".
Invalid values (or combination of values) in *XBRD, MMortality, FMortality, AnnuityType, Method, PHSorPY, MGEN*, and/or *FGEN*.
TableInd parameter is populated with something other than an integer from 0 to 7.
Invalid date entered for *DOPT* parameter.

Average Compensation Functions

02/26/2016

HAVG
07/12/2024

Format
HAVG(*numberOfYears, salaryData*, *IgnoreZeros*)

Return
The average of the high non-consecutive *numberOfYears* in the *salaryData*

Example
=HAVG(3, A1:A4**) returns 11000** (where A1:A4 contains 10000, 11000, 8000, and 12000)

Parameters
numberOfYears is the number of years over which the salary average is computed
salaryData is an Excel range (row or column) that contains salary data (e.g., A1:A12)
IgnoreZeros (optional) is number (0 or 1) which indicates whether zero or blank salaries are ignored

Note: Empty cells will be recognized as zeros. Zeros will be figured into the average. However, if the IgnoreZeros parameter is set to 1, the function will not use zero or blank entries in the salaryData parameter. If the IgnoreZeros parameter is not populated or is set to 0, the functions will use zero and blank entries to calculate the average.

HCAVG
02/26/2016

Format
HCAVG(*numberOfYears, salaryData*, *IgnoreZeros*)

Return
The average of the high consecutive *numberOfYears* in the *salaryData*

Example
=HCAVG(3, A1:A4) **returns 10333.33** (where A1:A4 contains 10000, 11000, 8000, and 12000)

Parameters
numberOfYears is the number of years over which the salary average is computed
salaryData is an Excel range (row or column) that contains salary data (e.g., A1:A12)
IgnoreZeros (optional) is number (0 or 1) which indicates whether zero or blank salaries are ignored

Note: Empty cells will be recognized as zeros. Zeros will be figured into the average. However, if the IgnoreZeros parameter is set to 1, the function will not use zero or blank entries in the salaryData parameter. If the IgnoreZeros parameter is not populated or is set to 0, the functions will use zero and blank entries to calculate the average.

Guaranteed Benefit Functions
09/28/2017

MAXLIM
09/28/2017

Note This function replaces the functionality of MIL and MIL2.

Format
MAXLIM(*DOPT, DOB, SDOB, XRD, Mths2, SPC, FORM, Hcavg5, RETSTAT*)

Return

Maximum Insurance Limit

The MAXLIM function returns the maximum insurance limit (monthly benefit amount) based on the inputs provided by the user. The function handles many types of annuity forms. Contact TRMD if the

plan benefit form of annuity is not covered by the function so an assessment can be conducted to determine if the function should be modified to handle the form of annuity in the plan.

MAXLIM supports retirement ages greater than 65 (adjusts the MIL using the PBGC late retirement factor).

MAXLIM allows survivor percentages that are greater than 1 and less than 50 when the annuity form = "JSC" or "JSP" and limits the form conversion factor to 1.0 when annuity form = "JSC", "JSP", "JSN", or "SLA". MAXLIM supports the annuity forms of "CTN", "JSN", and "JSP" in addition to the annuity forms of "SLA", "JSC", and "JSJ".

When contingent annuitant is more than 35 years younger than primary annuitant and when *FORM* is equal to "JSC", "JSP", "JSN", or "JSJ", the age adjustment factor is determined using the following formula:

0.725 – (0.005 x years younger in excess of 35)

When contingent annuitant is more than 35 years older than primary annuitant and when *FORM* is equal to "JSC", "JSP", "JSN", or "JSJ", the age adjustment factor is determined using the following formula:

1.1375 + (0.0025 x years older in excess of 35)

MAXLIM will use "JSP" in the *FORM* parameter to identify J&50%S pop-up annuity and calculate the benefit. The steps to calculate the benefit are provided in the Actuarial Technical Manual.

Example

=MAXLIM(DATE(2008, 07, 01), DATE(1943, 7, 01), DATE(1944, 07, 01), DATE(2008, 07, 01), 0, 25%, "JSP", 50000, "2") **returns 4039.87**

Parameters

DOPT is Date of Plan Termination
DOB is participant date of birth
SDOB is spouse date of birth
XRD is participant expected retirement date
Mths2 is number of months remaining in certain period at DOPT

Note If the FORM *parameter is populated with "SLA", a non-integer entry in this parameter will be used without any rounding, but otherwise a non-integer entry is first rounded by the function before calculating the maximum insurance limit. For example, when the* FORM *parameter is set to "SLA", an entry of 15 will generate a different result than 15.25; however, when the* FORM *parameter is set to something other than "SLA", an entry of 15 and 15.25 will generate the same result as the function will round the 15.25 entry to 15 before making the calculation.*

SPC is secondary annuitant percent of *XRD* benefit form
FORM
Hcavg5 is consecutive high 5 calendar years average monthly salary
RETSTAT is participant's retirement status

Suggested Input

To get SLA, input code="SLA", SPC=0, Mths2=0
To get nC&C, input code="SLA", SPC=0, Mths2=n
To get J&S (contingent basis), input code="JSC", nonzero SPC, Mths2=0
To get J&S (joint basis), input code="JSJ", nonzero SPC, Mths2=0
To get J&SC&C (contingent basis), input code="JSC", nonzero SPC and Mths2

Error

FORM is not one of "SLA", "JSC", "JSJ", "CTN", "JSN" or "JSP"
Invalid *DOPT, DOB, XRD, SDOB*
XRD < *DOPT*
SPC < 0 or ≥ 50
DOB > *DOPT* or *SDOB* > *DOPT*
DOPT < 1/1/74
Mths2 > 1230
Hcavg5 < 0
FORM = "JSN" and *SPC* < 0.5 and *SPC* > 1
FORM = "JSJ" and *SPC* > 1
FORM = "JSN" and *Mths2* > 120
FORM = "CTN" and *Mths2* = 0
Attained age at *XRD* is < 0
RETSTAT = 1 with Attained age at *DOPT* < 0
SPC, *Mths2* is not numeric

MAXLIMPPA

09/28/2017

Note The MAXLIMPPA function is an improved and more robust version of the existing MAXLIM function. It includes several enhancements that make it easier to use and will help avoid mistakes that are sometimes made with the MAXLIM function. The rules for how to populate the parameters for this function are different than the rules for populating the parameters for the MAXLIM function, so it is important to understand the differences in these rules (populating the parameters for the MAXLIMPPA function using the rules for the MAXLIM function may lead to invalid results).

Format

MAXLIMPPA(*DOPT, BPD, XRD, DOB, DOD, SDOB, SDOD, BDOB, BDOD, Nonspind, FORM, SPCT, Mths2, Hcavg, retstat, ID, Disabmil, CertainBen, LevelizedBen, SurvivorBen*)

Return

Maximum Insurance Limit

The MAXLIMPPA function returns the maximum insurance limit (monthly benefit amount) based on the inputs provided by the user. The function handles many types of annuity forms. Contact TRMD if the plan benefit form of annuity is not covered by the function so an assessment can be conducted to determine if the function should be modified to handle the form of annuity in the plan.

MAXLIMPPA supports retirement ages greater than 65 (adjusts the MIL using the PBGC late retirement factors).

MAXLIMPPA allows survivor percentages that are greater than 1 and less than 50 when the annuity form = "JSC" or "JSP" and limits the form conversion factor to 1.0 when annuity form = "JSC", "JSP", "JSN", or "SLA". MAXLIMPPA supports the annuity forms of "CTN", "JSN", and "JSP" in addition to the annuity forms of "SLA", "JSC", and "JSJ".

When contingent annuitant is more than 35 years younger than primary annuitant and when form is equal to "JSC", "JSP", "JSN" or "JSJ", the age adjustment factor is determined using the following formula:

0.725 - 0.005 x years younger in excess of 35)

When contingent annuitant is more than 35 years older than primary annuitant and when form is equal to "JSC", "JSP", "JSN" or "JSJ", the age adjustment factor is determined using the following formula:

1.1375 + (0.0025 x years older in excess of 35)

MAXLIMPPA will use "JSP" in the *FORM* parameter to identify J&50%S pop-up annuity and calculate the benefit. The steps to calculate the benefit are provided in the Actuarial Technical Manual.

Example

=MAXLIMPPA(DATE(2015,06,15), DATE(2013,06,15), DATE(2010,06,01), DATE(1950,05,01), 0, DATE(1954,05,01), 0, 0, 0, "N", "JSC", 0.50, 0, 50000, "1", "1") **returns 3607.41**

=MAXLIMPPA(DATE(2015,06,15), DATE(2013,06,15), DATE(2014,06,01), DATE(1950,05,01), DATE(2014,07,01), DATE(1954,05,01), 0, 0, 0, "N", "JSC", 0.50, 120, 50000, "1", "2") **returns 2905.55**

=MAXLIMPPA(DATE(2015,06,15), DATE(2013,06,15), DATE(2020,06,01), DATE(1960,05,01), 0, 0, 0, 0, 0, "N", "SLA", 0, 120, 50000, "2", "1") **returns 2905.55**

Parameters

DOPT is Date of Plan Termination
BPD is Bankruptcy Petition Date—populated only when the plan terminates while in bankruptcy (enter 0 or reference a blank cell when *BPD* does not apply). The date entered in this parameter must be on or after 09/16/2006 and before the date entered in the *DOPT* parameter.
XRD is Participant/AP's Actual or Expected Date of Retirement—must be on or before date entered in the *DOPT* parameter if "1" is entered in the *retstat* parameter and must be on or after the first of the month on or following the date entered in the *DOPT* parameter if a value other than "1" is entered in the *RETSTAT* parameter (for a beneficiary record where the beneficiary is receiving a QPSA benefit because the participant died before retiring, *XRD* should be populated with the commencement date of the QPSA benefit but otherwise *XRD* should be populated with the commencement date of the participant's benefit).
DOB is Participant/AP's date of birth—must be before date entered in *DOPT, BPD, XRD*, and *DOD* parameters.
DOD is participant/AP's date of death—if date entered in *DOPT* parameter is on the first of the month, must be before date entered in *DOPT* parameter if "2" is entered in the *ID* parameter and must be on or after date entered in *DOPT* parameter if "1" or "4" is entered in the *ID* parameter, and if date entered in *DOPT* parameter is not on the first of the month, must be on or before date entered in *DOPT* parameter

if "2" is entered in the *ID* parameter and must be after date entered in *DOPT* parameter if "1" or "4" is entered in the *ID* parameter.
SDOB is Spouse's Date of Birth—must be before date entered in *XRD*, *DOD*, and *SDOD* parameters.
SDOD is Spouse's Date of Death—must be on or after date entered in *XRD* parameter.
BDOB is Beneficiary's Date of Birth—must be before date entered in *XRD*, *DOD*, and *BDOD* parameters.
BDOD is Beneficiary's Date of Death—must be on or after date entered in *XRD* parameter.
Nonspind is Non-Spouse Beneficiary Indicator—must be equal to "Y" or "N".
FORM is Participant/AP's Form of Annuity Code—even if a beneficiary record.
SPCT is Participant/AP's Survivor Percentage—must be entered as a decimal value that is greater than or equal to 0 and less than 50 (note, this is 50 and not 0.50).
Mths2 is Participant/AP's Months Certain—must be greater than or equal to 0 and less than 1230.

Note If the FORM *parameter is populated with "SLA", a non-integer entry in the* Mths2 *parameter will be used without any rounding, but otherwise a non-integer entry is first rounded by the function before calculating the maximum insurance limit. For example, when the* form *parameter is set to "SLA", an entry of 15 will generate a different result than 15.25; however, when the* FORM *parameter is set to something other than "SLA", an entry of 15 and 15.25 will generate the same result as the function will round the 15.25 entry to 15 before performing the calculation.*

Hcavg is consecutive high 5 calendar years average monthly salary—must be computed at earlier of *DOPT* and *BPD*.
RETSTAT is the retirement status at *DOPT*—must be "1", "2", "3", or "4".
ID is the record type (participant, beneficiary, or alternate payee)—must be "1", "2", or "4".
Disabmil is Disability Max Indicator must be "Y" or "N" (this is an optional parameter and when left blank defaults to "N"). The setting is based on eligibility for disability maximum insurance limit at the earlier of *DOPT* and *BPD*.
CertainBen is the amount of the benefit that is paid for the balance of the certain period if the primary annuitant dies before the certain period expires. It can be smaller or larger than the levelized benefit. The function will adjust the factor applied for the certain period if the value in the *CertainBen* is not equal to the value in the *LevelizedBen* parameter.
LevelizedBen is the amount of the levelized benefit. This parameter must be populated if either the *CertainBen* or *SurvivorBen* parameters are populated.
SurvivorBen is the amount of the survivor benefit paid to the contingent annuitant if the primary annuitant dies first. It can be smaller or larger than the levelized benefit. The function will adjust the survivor percentage if the value in the *SurvivorBen* parameter is not equal to the value in the *LevelizedBen* parameter.
See examples 33 and 34 in IV.R. Examples of Calculating Monthly Benefits Guaranteed by PBGC in the ATM for additional information on the purpose of the last three optional parameters.

Possible Inputs for Form of Annuity

To get SLA for participant/AP, FORM = "SLA", SPCT = 0, Mths2 = 0
To get SLA for beneficiary, FORM = "JSC", SPCT = 0.50, Mths2 = 0
To get nC&C for participant/AP, FORM = "SLA", SPCT = 0, Mths2 = n
To get nC&C for beneficiary, FORM = "JSC", SPCT = 0.50, Mths2 = n
To get J&n%S for participant (contingent basis), FORM = "JSC", SPCT = n, Mths2 = 0
To get J&n%S for participant (joint basis), FORM = "JSJ", SPCT = n, Mths2 = 0

To get Traditional J&n%S with mCertain for participant (contingent basis), FORM = "JSC", SPCT = n, Mths2 = m
To get Non-Traditional J&n%S with mCertain for participant (contingent basis), FORM = "JSN", SPCT = n, Mths2 = m

Note Populate the FORM*,* SPCT*, and* Mths *parameters based on the participant/AP's original form of annuity. For a participant who commenced his/her benefit before dying, this is the form of annuity for the participant's benefit even if the participant died before* DOPT *(i.e.,* ID *= '2'). For a participant who died before retiring and before* DOPT *(i.e.,* ID *= '2' and beneficiary is receiving a QPSA benefit) this is the joint-life form of annuity upon which the QPSA is based, which is generally the same as the QJSA. User guidance for populating these three parameters is provided in the next three notes.*

Note FORM *parameter:*

If RETSTAT = '1' and ID = '1' or '4' enter value in FORM_CODE_ARD

If RETSTAT = '1' and ID = '2' and DOR < DOD enter value in FORM_CODE_PTP

If RETSTAT = '1' and ID = '2' and DOR ≥ DOD enter value in FORM_CODE_PTP_QPSA

If RETSTAT ≠ '1' and ID = '1' or '4' and CALC_INDICATOR = 'V' enter value in FORM_CODE

If RETSTAT ≠ '1' and ID = '2' and CALC_INDICATOR = 'V' enter value in FORM_CODE_PTP_QPSA

If RETSTAT ≠ '1' and CALC_INDICATOR = 'R' enter value in FORM_CODE (Runtime will populate the FORM_CODE field correctly)

The fields FORM_CODE_ARD, FORM_CODE_PTP, FORM_CODE_PTP_QPSA and FORM_CODE contain single character codes '1', '2', '3', '4', '5', '6', '7', '8', '9', '0', 'A', 'B', 'C', 'D', 'E', 'F', 'G', or 'H'. These codes need to be translated into one of the valid values that can be entered in the FORM *parameter. For example, a code of '9' translates to 'JSC', a code of '0' translates to 'JSP', a code '2' translates to 'SLA', etc.*

Note SPCT *parameter:*

If RETSTAT = '1' and ID = '1' or '4' enter value in SPC_ARD

If RETSTAT = '1' and ID = '2' and DOR < DOD enter value in SPC_PTP

If RETSTAT = '1' and ID = '2' and DOR ≥ DOD enter value in SPC_PTP_QPSA

If RETSTAT ≠ '1' and ID = '1' or '4' and CALC_INDICATOR = 'V' enter value in SPC_VAL If RETSTAT ≠ '1' and ID = '2' and CALC_INDICATOR = 'V' enter value in SPC_PTP_QPSA

If RETSTAT ≠ '1' and CALC_INDICATOR = 'R' enter value in SPC_VAL (Runtime will populate the SPC_VAL field correctly)

Note Mths2 *parameter:*

If RETSTAT = '1' and ID = '1' or '4' enter value in MTHS_ARD

If RETSTAT = '1' and ID = '2' and DOR < DOD enter value in MTHS_PTP

If RETSTAT = '1' and ID = '2' and DOR ≥ DOD enter value in MTHS_PTP_QPSA

If RETSTAT ≠ '1' and ID = '1' or '4' and CALC_INDICATOR = 'V' enter value in MTHS

If RETSTAT ≠ '1' and ID = '2' and CALC_INDICATOR = 'V' enter value in MTHS_PTP_QPSA

If RETSTAT ≠ '1' and CALC_INDICATOR = 'R' enter value in MTHS (Runtime will populate the MTHS field correctly)

Note The original date of retirement may not be known for all records with RETSTAT = '1'. A value must still be entered for the XRD *parameter. The date entered can impact the result of the calculation. For example, if the date entered is between BPD and DOPT, the age at the date entered in the* XRD *parameter is used—whereas if the date entered is before BPD, the age at the date entered in the* BPD *parameter is used.*

Also, the participant's original form of annuity may not be known for all records with RETSTAT = '1' and ID = '2'. Values for the participant form of annuity must still be entered for the FORM*,* SPCT*, and* Mths2 *parameters. For example, if the beneficiary is receiving an SLA, the* FORM *parameter should be populated with JSC and the* SPCT *parameter should be populated with a value greater than 0 (the actual percentage is not important).*

Note A beneficiary can be receiving a non-level survivor benefit that came from a traditional joint life annuity with a certain period.

The survivor benefit payable to the beneficiary is paid at the original amount payable to the participant until the certain period expires and then drops to the survivor benefit amount. In order to apply the MIL, the beneficiary's benefit must be levelized and the levelized benefit will be an amount less than the benefit payable if the beneficiary dies before the end of the certain period. If the FORM *parameter is populated with "JSC" and the* SPCT *parameter is populated with "0.50" and the* Mths2 *parameter is populated with "120" and certain period is not expired at DOPT, the function will return an MIL value that is for a level C&C benefit in which the benefit payable if the beneficiary dies before the end of the certain period is the same as the level C&C benefit amount. ASD has confirmed that this is the correct MIL value for the beneficiary; however, it is necessary to convert the extra certain benefits to a temporary SLA (using plan AEQ) before applying the PBGC level-life factors and then convert the levelized amount back to a C&C.*

Error

FORM is not one of "SLA", "JSC", "JSJ", "CTN", "JSN" or "JSP"
Invalid *DOPT, BPD, XRD, DOB, DOD, SDOB, SDOD, BDOB*, or *BDOD*
BPD > *DOPT* or *BPD* < 09/16/2006
XRD < *DOPT* for *RETSTAT* ≠ "1" or *XRD* > *DOPT* for *RETSTAT* = "1"
SPCT < 0 or ≥ 50
DOB > (*DOPT, BPD, XRD*, or *DOD*)
SDOB > (*XRD*, *DOD*, or *SDOD*)
BDOB > (*XRD*, *DOD*, or *BDOD*)
DOD < *DOPT* for *ID* = "1"or "4" or *DOD* > *DOPT* for *ID* = "2"
SDOD < *XRD*
BDOD < *XRD*
DOPT < 01/01/1974

Mths2 > 1230
Hcavg5 < 0
FORM = "JSN" and *SPCT* < 0.5 and *SPCT* > 1
FORM = "JSJ" and *SPCT* > 1
FORM = "JSN" and *Mths2* > 120
FORM = "CTN" and *Mths2* = 0
Attained age at *XRD* is < 0
RETSTAT = 1 with attained age at *DOPT* < 0
SPCT or *Mths2* is not numeric
Nonspind is not "Y" or "N"
RETSTAT is not "1", "2", "3", or "4"
ID is not "1", "2", or "4"
Disabmil is not "Y" or "N" (can be left blank)
LevelizedBen is not populated with either *CertainBen* or *SurvivorBen* populated.

PHASEIN

04/27/2017

Format

PHASEIN(*percent, benefit*)

Return

The phased-in benefit amount for the benefit at the phase-in percent

Example

=PHASEIN(0.2, 15) **returns 15**

=PHASEIN(0.2, 50) **returns 20**

=PHASEIN(0.2, 150) **returns 30**

Parameters

percent is the phase-in percent expressed as a decimal. (valid range: 0 ~ 1.0, in 0.2 increments)
benefit is the amount of benefit increase under a plan amendment

Note See details in Section IV.B. of the Actuarial Technical Manual.

PHASEINPCT

09/28/2017

Format

PHASEINPCT(*EffectiveDate, AdoptedDate, DOPT, BPD, UCEBdate, SEPPAA*)

Return

The phase-in percentage used to populate the percent parameter in the PHASEIN function

Example

=PHASEINPCT(DATE(2014,07,01), DATE(2014,05,01), DATE(2017,06,01)) **returns 0.40**

=PHASEINPCT(DATE(2014,07,01), DATE(2014,05,01), DATE(2017,06,01), DATE(2016,06,01)) **returns 0.20**

=PHASEINPCT(DATE(2010,07,01), DATE(2010,05,01), DATE(2017,06,01), 0, DATE(2016,07,01)) **returns 0.00**

Parameters

EffectiveDate is the effective date of the plan document that included the benefit improvement or, if later, the effective date of the benefit improvement. The date entered must be on or before the date entered in the *DOPT* parameter.
AdoptedDate is the adoption date of the plan document that included the benefit improvement. The date entered must be on or before the date entered in the *DOPT* parameter.
DOPT is the Date of Plan Termination.
BPD is the Bankruptcy Petition Date. This is an optional parameter and should be populated only if the plan terminated while in bankruptcy. The date entered in this parameter must be on or after 09/16/2006.
UCEBdate is an optional parameter for the date of the UCEB (e.g., plant shutdown date for a shutdown benefit) and should be populated only when computing the phase-in percentage of a UCEB.
SEPPAA is an optional parameter that allows the phase-in percent to be populated for a pre-SEPPAA plan. If the function is populated with "Y", the phase-in percent is populated per the pre-SEPPAA rules.

Note The EffectiveDate *and* AdoptedDate *parameters are populated with the effective date and adoption date of the plan document that added the UCEB. If the date of the UCEB is after 07/26/2005, the latest of the date of the UCEB, the effective date of the plan document that added the UCEB, and the adoption date of the plan document that added the UCEB is used for calculating the phase-in percentage. If the date of the UCEB is on or before 07/26/2005, the later of the effective date and adoption date of the plan document that added the UCEB is used for calculating the phase-in percentage. The date entered must be on or before the date entered in the* DOPT *parameter.*

Note See details in Section IV.B of the Actuarial Technical Manual.

Error

EffectiveDate is after *DOPT*
AdoptedDate is after *DOPT*
BPD is before 09/16/2006
UCEBdate is after *DOPT*

PBGCLLF

09/28/2017

Note This function replaces the functionality of LLF (which had replaced LBF).

Format

PBGCLLF(*DOPT, DOB, SDOB, BDOB, Nonspind, ID, StartDate, EndDate, BPD*)

Return

The factor for converting a Temporary Lifetime Annuity (a monthly benefit payable for only a specified number of months) into a Lifetime Annuity (a monthly benefit payable until a participant dies). The factors are a function of the temporary period in which the annuity is paid and the payee's age at the latter of the *DOPT*/*BPD* and the annuity's start date.

The PBGCLLF is calculated using a table of factors where ages are whole numbers and for temporary periods. However, for fractional ages or temporary periods, ASD's methodology is followed via interpolation in the 4022.23(f)(1) table. If the temporary annuity is payable for less than one year, interpolation is done between zero and the one-year factor, and the factor is rounded to either 3 or 4 decimal places. However, rounding is not necessary if no interpolation is done. Factors outside of the 4022.23(f)(1) table are extrapolated using the actuarial equivalence for PBGC optional forms (GAM83 blended 50%/50% and 6% interest).

Example

=PBGCLLF(DATE(2002, 12, 18), DATE(1950, 03, 01), 0, 0, "N", "1", DATE(2010, 08, 01), DATE(2012, 03, 01)) **returns 0.126**

Parameters

DOPT is Date of Plan Termination.
DOB is participant/alternate payee's date of birth.
SDOB is the spouse beneficiary date of birth.
BDOB is the non-spouse beneficiary date of birth.
Nonspind is the non-spouse beneficiary indicator – populate with "Y" or "N".
ID is the record id-type – populate with "1", "2", or "4".
StartDate is the date the temporary benefit commences—if the temporary benefit commenced before DOPT, enter the actual pre-DOPT start date of the temporary benefit (i.e. do not enter the first of the month or following DOPT).
EndDate is the date the temporary benefit ends—enter the date of the first payment following the expiration of the temporary benefit.
BPD is an optional parameter for the bankruptcy petition date if it applies (i.e., the plan terminated in bankruptcy and the bankruptcy petition date was on or after 9/16/2006). The date entered in this parameter must be on or after 09/16/2006 and before the date entered in the *DOPT* parameter.

Note StartDate, EndDate must be the 1st of the month.

Error

Invalid *DOPT*, *DOB*, *EndDate*, *StartDate*
StartDate on or after *EndDate*
StartDate or *EndDate* is not the 1st of the month
DOB after *DOPT*
DOB on or after *StartDate*
Attained age at max(*DOPT*, *StartDate*) > 110
Attained age + temporary years of payments > 124
BPD after *DOPT* or *BPD* before 09/16/2016

WAM

04/27/2017

Format

WAM(*dopt, part_level_benefit, dob, sdob, end_date_certain, surv_benefit_int1, start_date_int1, surv_benefit_int2, start_date_int2, surv_benefit_int3, start_date_int3*)

Return

Weighted Average Method

The WAM function uses the Weighted Average Method to calculate the Survivor Percentage to be used for applying the Maximum Insurance and phase-in limitations when there is a free surviving spouse benefit.

Example

=WAM(DATE (2007, 06, 30), 1000, DATE(1950, 06, 15), DATE(1954, 06, 15), DATE(2010, 07, 01), 500, DATE(2005, 07, 01), 150, DATE(2014, 07, 01), 100, DATE(2019, 07, 01)) **returns 0.1060753**

Parameters

dopt is Date of Plan Termination
part_level_benefit is Participants Levelized Benefit
dob is Participant's date of birth
sdob is Survivor's date of birth
end_date_certain is End Date for Certain Period (an optional parameter, if included must be a valid date later than *start_date_int1*, must be on the 1st of the month)—enter the date of the first payment following the expiration of the certain period.
surv_benefit_int1 is Total Survivor Benefit Payable if the participant died at the beginning of Interval1 (must be greater than or equal to 0 and less than or equal to *surv_benefit_int2*)
start_date_int1 is Start Date for Interval1 (for Pre-DOPT retirees enter a date before DOPT otherwise use XRD, must be on the 1st of the month)—enter the date of the first payment following the expiration of the certain period.
surv_benefit_int2 is Total Survivor Benefit Payable if the participant died at the beginning of Interval2 (must be greater than or equal to 0 and less than or equal to *surv_benefit_int3*)
start_date_int2 is Start Date for Interval2 (must be later than or equal to *start_date_int1*, must be on the 1st of the month)
surv_benefit_int3 is Total Survivor Benefit Payable if the Participant died at the beginning of Interval3 (an optional parameter, if included must be greater than or equal to 0 and less than or equal to *surv_benefit_int2*)
start_date_int3 is Start Date for Interval3 (an optional parameter, if included must be later than or equal to *start_date_int2* and *start_date_int1*, must be on the 1st of the month.)

Error

Invalid *dopt, dob, sdob, end_date_certain, start_date_int1, start_date_int2, start_date_int3*
dopt < 01/01/1974 or *dopt* < *dob* or *dopt* < *sdob*
part_level_benefit ≤ 0
dob > *dopt* or *dob* > *start_date_int1* or *dob* > *start_date_int2* or *dob* > *start_date_int3*
sdob > *dopt* or *sdob* > *start_date_int1* or *sdob* > *start_date_int2* or *sdob* > *start_date_int3*
end_date_certain is not first of the month or *end_date_certain* < *start_date_int1*
surv_benefit_int1 < 0 or *surv_benefit_int1* < *surv_benefit_int2* or *surv_benefit_int1* < *surv_benefit_int3*
start_date_int1 is not first of the month or *start_date_int1* > *start_date_int2* or *start_date_int1* > *start_date_int3*
surv_benefit_int2 < 0 or *surv_benefit_int2* > *surv_benefit_int2* or *surv_benefit_int2* < *surv_benefit_int3*

start_date_int2 is not on the first of the month or *start_date_int2* < *dob* or *start_date_int2* < *sdob* or *start_date_int2* < *start_date_int1* or *start_date_int2* > *start_date_int3*
surv_benefit_int3 < 0 or *surv_benefit_int3* > *surv_benefit_int1* or *surv_benefit_int3* < *surv_benefit_int2*
start_date_int3 is not on the first of the month or *start_date_int3* < *dob* or *start_date_int3* < *sdob* or *start_date_int3* < *start_date_int1* or *start_date_int3* < *start_date_int2*

417(e) Functions

02/26/2016

PPALSDATE

02/26/2016

Format

PPALSDATE(*distdate, stabilityperiod, lookbackperiod, plananniv*)

Return

PPA Lump Sum Date

The PPALSDATE function calculates the date to use for looking up the 417(e) interest rate or the first day of the stability period containing the distribution or determination date.

Example

=PPALSDATE(DATE (2007, 4, 1), "PY", 2, "0501") **returns 03/01/2006**

Parameters

distdate is the distribution or determination date.
stabilityperiod is the type of stability period. Must be one of the following values:

PY – plan year
CY – calendar year
PQ – plan quarter
CQ – calendar quarter
M – monthly

lookbackperiod is the lookback period in months (must be an integer between 1 and 5).
plananniv is the plan anniversary, a four character string in the format mmdd (for example, "0401" for April 1).
returntype is used to specify whether the function should return the date for looking up the interest date or the first day of the stability period. The valid values are '0' for looking up the interest rate date and '1' for the first day of the stability period. This is an optional parameter with '0' as the default value.

Error

Invalid *distdate*
stabilityperiod not one of PY, CY, PQ, CQ, or M
lookbackperiod not one of 1, 2, 3, 4, or 5
dob > *dopt* or dob > *start_date_int1* or *dob* > *start_date_int2* or *dob* > *start_date_int3*
plananniv month < 1 or > 12
plananniv day < 1 or > 31
returntype is not 0 or 1.

PPALSRATE

02/26/2016

Format

PPALSRATE(*distdate, stabilityperiod, lookbackperiod, plananniv, segment*)

Return

PPA Lump Sum Rate

The PPALSRATE function looks up the individual 417(e) applicable interest rates (30-year treasury prior to the start of the 2008 plan year and the segment rates on or after the start of the 2008 plan year) based on the inputs provided by the user. It is not expected that this function will be commonly used – it is provided in case the actuary might wish to reconstruct the interest rates used to calculate the average provided by PPALSAVG.

Example

=PPALSRATE(DATE (2007, 4, 1), "PY", 2, "0501", 3) **returns 0.0473**

Parameters

distdate is the distribution date.
stabilityperiod is the type of stability period. Must be one of the following values:

PY – plan year
CY – calendar year
PQ – plan quarter
CQ – calendar quarter
M – monthly

lookbackperiod is the lookback period in months (must be an integer between 1 and 5).
plananniv is the plan anniversary, a four character string in the format mmdd (for example, "0401" for April 1).
segment determines which of the three segment rates the function will return (must be 1, 2, or 3).

Error

Invalid *distdate*
stabilityperiod not one of PY, CY, PQ, CQ, or M
lookbackperiod not one of 1, 2, 3, 4, or 5
dob > *dopt* or *dob* > *start_date_int1* or *dob* > *start_date_int2* or *dob* > *start_date_int3*
plananniv month < 1 or > 12
plananniv day < 1 or > 31
segment not one of 1, 2, or 3

PPALSAVG

02/26/2016

Format

PPALSAVG(*dopt, stabilityperiod, lookbackperiod, plananniv, segment, planeffectivedate*)

Return

PPA Lump Sum Average Rate

The PPALSAVG function calculates the average of the 417(e) applicable interest rates (30-year treasury prior to the start of the 2008 plan year and the segment rates on or after the start of the 2008 plan year) during the five-year period preceeding DOPT. If the stability period is plan year or calendar year, the function will average the interest rates in effect at the beginning of the five stability periods that started in the five-year period preceeding DOPT. If the stability period is plan quarter or calendar quarter, the function will average the interest rates in effect at the beginning of the twenty stability periods that started in the five-year period preceeding DOPT. If the stability period is a single month, the function will average the interest rates in effect at the beginning of the sixty stability periods that started in the five-year period preceeding DOPT.

If a plan specifies calendar year stability with a plan anniversary other than 01/01 or calendar quarter stability with a plan anniversary other then 01/01, 04/01, 07/01, or 10/01, it is possible that the plan would have had to use more than one interest rate in one of the stability periods included in the average. This will occur if any of the stability periods used in the average span two plan years, at least one of which is 2008, 2009, 2010, or 2011 (plan years in which the segment rates were still being phased in). For stability periods in which two interest rates would have been used, the function performs a weighted average (based on the length of time that each interest rate was used in the stability period) of the two interest rates and then uses that result in calculating the final average. When the final stability period spans two plan years, at least one of which is 2008 to 2011 but DOPT is before the plan anniversary contained in that final stability period, only the first interest rate for that stability period is used in computing the average (i.e., a weighted average interest rate is not computed).

The function optionally takes the plan effective date as a parameter. Interest rates before the plan effective date are not included in the segment rate averages. Therefore, if the effective date is less than five years before DOPT, the average will be computed using only the segments rates that would have been used by the plan from the effective date until DOPT. The applicable rate at the plan effective date is included in the average without any adjustment if the plan effective date falls in the five-year period proceeding DOPT even if the plan effective date is not coincident with the beginning of a stability period. When the first stability period spans two plan years, at least one of which is 2008 to 2011, but the plan effective date is on or after the plan anniversary contained in that first stability period, only the second interest rate for that stability period is used in computing the average (i.e., a weighted average interest rate is not computed).

Note In a plan that converted from a traditional defined-benefit formula to a cash balance formula, the date of the conversion is considered the plan effective date for purposes of the computing the PPA lump sum average.

Example

=PPALSAVG(DATE (2007, 4, 1), “PY”, 2, “0301”, 3, DATE(2005, 8, 1)) **returns 0.047233**

Parameters

dopt is the date of plan termination.
stabilityperiod is the type of stability period. Must be one of the following values:

PY – plan year
CY – calendar year
PQ – plan quarter
CQ – calendar quarter

M – monthly

lookbackperiod is the lookback period in months (must be an integer between 1 and 5).
plananniv is the plan anniversary, a four character string in the format MMDD (for example, “0401” for April 1).
segment determines which of the three segment rates the function will return (must be 1, 2, or 3).
planeffectivedate is the plan provision effective date (for plans that convert from traditional defined benefit to cash balance, enter the date of the conversion). Interest rates before the plan effective date are not included in the average. This parameter is optional – if omitted, a full five years of interest rates are included in the average.

Error

dopt is before beginning of 2008 plan year and plan effective date is before 06/29/2005.
At least one of the interest rates needed is after the last rate in the ATPBGC database.
stabilityperiod not one of PY, CY, PQ, CQ, or M
lookbackperiod not one of 1, 2, 3, 4, or 5
plananniv is not valid (e.g. 0431)
segment not one of 1, 2, or 3
invalid *planeffectivedate*
planeffectivedate on or after *dopt*

PLANYEAR

02/26/2016

Format

PLANYEAR(*lookupdate, plananniv*)

Return

Four-Digit Plan Year

The PLANYEAR function calculates the 4-digit plan year for the date specified.

Example

=PLANYEAR(DATE (2007, 4, 1),"0501") **returns 2006**

Parameters

lookupdate is the distribution or determination date.
plananniv is the plan anniversary, a four character string in the format MMDD (for example, "0401" for April 1).

Error

Invalid or missing value in *lookupdate* parameter
Invalid or missing value in *plananniv* parameter

Actuarial Present Value Factors

Add-in Functions

12/28/2020

Functions that return codes that are generated internally by other functions (e.g. NPVF2, ERFAEQ, LRFAEQ, BFCFAEQ, etc.). The outputs from these functions can be used as inputs to the other functions that generate these codes internally.

- MORTCODE allows a user to determine an actuarial mortality table based on the effective date of the table, calculation method, participant/beneficiary sex, and participant's health-status code.
- INTCODE allows a user to determine the interest rate structure based on the valuation date, calculation method, and 417(e) interest type (30-year treasury or segment rates) or plan year or plan anniversary.
- RATETIER allows a user to determine the interest or duration for a specified tier within an interest rate set based on the effective date of the rates and the interest method.

Functions that return a description of internal codes used by other functions.

- MORTDESC returns a description of a mortality code or the base year of the mortality table
- PROJDESC returns a description of a projection scale code or the years covered by the scale

Functions that calculate the present value factor for annuities or single sum fixed term death benefits as specified by PBGC ASD using both old and current interest rate structure (Federal Register, September 28, 1993).

- NPVF2 - compute the present value factor of annuity for user-specified annuity type, benefit form and interest rate structure (old, current or lump sum).
- NPVFSS - compute the present value factor of single sum fixed term death benefit for user specified retirement type (pre or post), temporary period, deferral period and benefit increase/decrease rate.
- NPVFEEC (deprecated)- compute the present value factor for a pre-retirement single sum death benefit for returning employee contributions.
- QPSAPVF - compute the present value factor for determining the liability of the QPSA benefit that is included in the total liability for married (or assumed to be married) participant records in which the expected retirement age is greater than the age nearest birthday at DOPT in plans that do not charge for the QPSA coverage (i.e. there is no reduction to the accrued benefit for the QPSA coverage).
- NPVF2_NP is a non-production version of NPVF2 that allows the user to enter a range from the Excel spreadsheet continuing 126 q values from age 0 to age 125 for the mortality table parameters.

Functions for calculating benefits in PBGC optional forms of annuity.

- PBGCOFAVAL is a function that can be used to compute the benefit amount in a PBGC optional form of annuity given the value of the benefit in the normal form of annuity.

- PBGCOFA is a function that can be used to compute the benefit amount in a PBGC optional form of annuity given the plan benefit amount and form of annuity.

Functions for calculating commutation functions using only mortality (user is able to lookup PBGC lump sum or annuity mortality or 417(e) applicable mortality) or mortality improvement factors.

- LX is a commutation function that returns the lives at a given age using the mortality table specified.
- QX is a commutation function that returns the probability of death using the mortality table specified.
- PX is a commutation function that returns the probability of survival using the mortality table specified.
- SX is a function that returns the mortality improvement factor that can be applied to a q. Functions for calculating commutation functions using PBGC's old interest rate structure:

Functions for calculating commutation functions using only interest:

- VXALL
- IXALL

Functions for calculating commutation functions using ‘O’ or ‘N’ method interest rates:

- DXYALL
- NXYALL
- EXYALL

Older functions for calculating commutation functions using ‘O’ method interest rates (these functions may be deprecated in the future):

- DX
- NX
- DXY
- NXY
- EX

Older functions for calculating commutation functions using ’N’ method interest rates (these functions may be deprecated in the future):

- NEX
- NNX
- NNXY

Functions for calculating factors for levelizing free survivor spouse benefits:

- KONE
- KTWO.

MORTCODE

09/24/2018

MORTCODE function allows users to determine an actuarial mortality table based on the effective date of the table, calculation method, primary annuitant's sex, and participant's health-status code.

Format

09/24/2018

MORTCODE (*Smethod, DateorMortCode, AnnCode, PaSex, Hcode, TableInd, DOPT, CodeorDesc*)

Input

12/28/2020

Smethod
DateorMortCode: Enter a date or enter the mortality table code such as LS00SUYYYY, LS06SUYYYY, or LS12SUYYYY
AnnCode: String
This parameter specifies either the primary or contingent annuitant.
"P": Primary annuitant.
"C": Contingent annuitant.
PaSex: String
This parameter specifies the gender of the primary and contingent annuitants.
"M" or "MF": Male primary annuitant and female contingent annuitant.
"F" or "FM": Female primary annuitant and male contingent annuitant.
"MM": Male primary annuitant and male contingent annuitant.
"FF": Female primary annuitant and female contingent annuitant.
Hcode
TableInd (optional)
DOPT (optional) – must be populated when using 417(e)mortality for years after 2018, so that the correct projection scale is used with the 2006 base table.
CodeorDesc: This is an optional parameter that can be used to request a description for the mortality that will be used based on the inputs in the other parameters (by default the function only returns a mortality table code). The function will return descriptions for PBGC lump sum or annuity mortality tables and will return descriptions for IRS mortality tables. Use the MORTDESC function to obtain the description for mortality table codes contained in a record in the MORTNAME table in the ATPBGC database.
"C" – returns the mortality table code (default value)
"D" – returns a description for the mortality table (PBGC lump sum or annuity mortality table or IRS mortality tables)

Note MORTCODE is a function specifically created to return the value that is determined by the internal MORTNAME function which is a private function called by NPVF2, ERFAEQ, LRFAEQ, etc. to determine the

mortality to use in the calculation when a mortality table code is not provided in the mortality parameters for these functions (i.e., a date is entered in the mortality table parameters which is used with other inputs to determine the mortality to use in the function) or when the special codes of LS00SUYYYY, LS06SUYYYYY, or LS12SUYYYYY are entered in the mortality table parameters.

INTCODE

02/26/2016

Format

02/26/2016

INTCODE (*Method,XBRD, PHSorPY*)

Input

02/26/2016

Method

XBRD

PHSorPY

Note INTCODE can be used to obtain the interest rate used by functions such as NPVF2, ERFAEQ, and LRFAEQ when an explicit interest rate is not provided (for example, when a date is entered in the interest rate parameter and the function determines the interest rate from rates stored in the ATPBGC database).

RATETIER

12/28/2020

Format

12/28/2020

RATETIER(*Method,XBRD, retType*)

Input

12/28/2020

Method: type of interest rate structure ('O' or 'N')
XBRD: interest – can be entered as date only (not allowed to use Excel range, literal interest rate, or string)
retType: Determines the type of result returned.
If *Method* is 'O', enter one of the following:

- IMM – immediate interest rate
- DEA – death rate
- RATE1 – interest rate of first tier
- RATE2 – interest rate of second tier
- RATE3 – interest rate of third tier
- DEF1 – duration of the first deferral period in years
- DEF2 – duration of the second deferral period in years

If the *Method* is 'N', enter one of the following:

- SEL – interest rate of the select period
- ULT – interest rate of the ultimate period
- DUR – duration of the select period in years

Example
12/28/2020

If cell A1 is 1/1/2000:

=RATETIER("O", A1, "RATE1") **returns 0.0425**

=RATETIER("O", A1, "DEF1") **returns 7**

=RATETIER("N", A1, "SEL") **returns 0.069**

=RATETIER("N", A1, "DUR") **returns 25**

Note The RATETIER function currently requires the xBRD parameter to be a reference to a cell, and does not allow the xBRD parameter to be a literal date value (such as DATE(2000, 1, 1). This will be fixed in a future release.

MORTDESC
12/28/2020

The MORTDESC function allows users to obtain the description or base year for a mortality table code. The function does support some complex mortality table codes, such as tables that are generated at calculation time (such as 2M06, 2F06, DM06, DF06, LS00SU2008, LS06SU2018, LS12SU2024, etc.) and table codes that include offsets and projections.

Format
09/24/2018

MORTDESC (*MortCode, ReturnType*)

Input
09/24/2018

MortCode: 4-character mortality table code (e.g. AA20) that is in one of the records in the MORT_NAME table in the ATPBGC database.

ReturnType (optional parameter):
0 – the description of the mortality table (default value)
1 – the base year of the mortality table

Note MORTDESC currently does not support mortality table codes that include blending, or that use the 1D or 2D syntax. The function may be enhanced in a future release to be able to handle some of these scenarios.

PROJDESC
12/28/2020

The PROJDESC function allows users to obtain the description for a projection scale or mortality improvement scale that is one of the records in the PROJ_SCALE_NAME table in the ATPBGC database (if a description is available).

Format
12/28/2020

PROJDESC (*ProjCode, ReturnType*)

Input
12/28/2020

ProjCode: 2-character projection scale or mortality improvement code (e.g. AA), that is in one of the records in the PROJ_SCALE_NAME table in the ATPBGC database.

ReturnType (optional parameter):
0 – the description of the projection scale (default value)
1 – the years covered by the projection scale

Example
12/28/2020

=PROJDESC("AA") **returns Unisex Factors from SOA AA Mortality Improvement Scale**

=PROJDESC("AA",1) **returns 1977 - 1993**

NPVF2
09/24/2018

Format
12/28/2020

NPVF2 (*AnnType, benefitForm, method, BRD, sex, Age, pXRA, sxra, survivorPercent, certainPeriod, temporaryPeriod, maleTableName, femaleTableName, deferralAssump, maleGeneration, femaleGeneration, planYrorhealthStat, Agedopt, COLARate, TableInd, DOPT, PreMMortality, PreFMortality*)

Input
09/24/2018

AnnType

benefitForm

method

BRD

sex: String

This parameter specifies the gender of the primary and contingent annuitants.

"M" or "MF": Male primary annuitant and female contingent annuitant.

"F" or "FM": Female primary annuitant and male contingent annuitant.

"MM": Male primary annuitant and male contingent annuitant.

"FF": Female primary annuitant and female contingent annuitant.

age: Float

This parameter specifies the participant's age at which NPVF2 is calculated. For the "Exact" annuityTypes, it is rounded to the nearest month. For the Woolhouse annuityTypes, a non-integer parameter will produce an error.

xra: Float

This parameter specifies the deferred participant's age at which the benefit payable to the participant is started. For the "Exact" annuityTypes, it is rounded to the nearest month. For the Woolhouse annuityTypes, a non-integer parameter will produce an error.

sxra: Float

This parameter specifies deferred beneficiary's age at which the benefit payable to the participant is started. For the "Exact" annuityTypes, it is rounded to the nearest month. For the Woolhouse annuityTypes, a non-integer parameter will produce an error.

survivorPercent: Float

This parameter specifies a percentage for the joint and survivor annuity calculations. For example, 0.5.

certainPeriod: Integer

This parameter specifies a certain period (in months) for the annuity certain calculations (use 0 if there is no certain period).

temporaryPeriod: Integer

This parameter specifies a temporary period (in months) for the temporary annuity calculations (use 0 if there is no temporary period).

Note If the sum of XRA, certainPeriod/12, and temporaryPeriod/12 exceeds 125, an error results. If both a certainPeriod and a temporaryPeriod are used, the temporaryPeriod commences at the expiration of the certainPeriod.

MMortality and *FMortality*

deferralAssump: String

This parameter specifies the mortality included in the deferral period when XRA is greater than ANB. The following values can be used:

> N: Do not include participant or beneficiary mortality in deferral period (i.e. discount for interest only from XRA to ANB).

P: Use only participant mortality in deferral period and exclude beneficiary mortality in deferral period (this is the appropriate setting when determining the PBGC annuity or lump sum present value factor in the valuation for a deferred joint life annuity).

B: Use both participant and beneficiary mortality in deferral period.

MGen and *FGen*

PHSorPY (optional)

doptAge (optional): Integer

Specifies an optional parameter which is applicable only when the method parameter is set to “L”.

When a value is entered in the DOPTAge parameter, it affects the determination of the number of segments and the length for each segment. The value in the DOPTage parameter is subtracted from the Age parameter and then that result is used to determine when the first segment starts.

Note If the certainPeriod parameter is not divisible by 12 and the method parameter is equal to 'MP', 'QP', or 'SP', two separate NPVF2 calculations are required and the final result is obtained by interpolating between these two NPVF2 calculations.

COLARate is Cost of Living Adjustment (applied post deferral period) (optional parameter)

The COLA rate must be entered as a decimal value from 0 to 1. If a deferral period is specified (ANB < XRA), the interest rate during the deferral period is not offset (the assumption is that the COLA is only applicable once the benefit commences). The function only supports calculation with a COLA when the calculation method is Woolhouse. Also, the calculation is being made based on the assumption that the COLA increase is annual and that the first increase occurs one year following date of retirement.

TableInd (optional)

DOPT (optional) – must be populated when using 417(e)mortality for years after 2018, so that the correct projection scale is used with the 2006 base table.

PreMMortality (optional) and *PreFMortality* (optional)

Algorithm

09/24/2018

In order to simplify the expressions, the following naming conventions are used:

sp = survivorPercent

r = certainPeriod

t = temporaryPeriod x = participant's age y = beneficiary's age

px = participant's deferred age

n = px - x

m = 1 if annuityType = "AX"

m = 2 if annuityType = "SX" or "SP"

m = 4 if annuityType = "QX" or "QP"

m = 12 if annuityType = "MX" or "MP"

The formulas for the present value factor below are expressed in terms of the annuities and deferral factors. The present value factor can be calculated using one of two different methods: (1) Exact method; and (2) Woolhouse method. The "Exact" method means the annuity is calculated using adjusted mortality rates for fractional years and discounting the payments made for each partial year period. The adjusted mortality rates are derived from the annual mortality rates based on the assumption of a uniform distribution of deaths within each year of age. The Woolhouse method means the annuity is calculated using the Woolhouse approximation formula; for example, the Woolhouse method determines the present value factor as:

$$\ddot{a}_x^{(m)} = \ddot{a}_x - (m-1)/2m$$

method = "O"

benefitForm = "SLA" & *DefAssump* = "P" (or "B"):

$$pvf = {}_nE_x \times (\ddot{a}_{\overline{n}|}^{(m)} + {}_{r|}\ddot{a}_{x+n:n}^{(m)})$$

for *DefAssump* = "N", the expression above is correct if nEx is understood to include the interest discount only.

benefitForm = "JSC" & *DefAssump* = "N" or "P":

$$pvf = {}_nE_x \times (\ddot{a}_{\overline{n}|}^{(m)} + {}_{r|}\ddot{a}_{x+n:n}^{(m)} + sp \times ({}_{r|}\ddot{a}_{y+n:n}^{(m)} - {}_{r|}\ddot{a}_{xy+n:n}^{(m)}))$$

benefitForm = "JSC" & *DefAssump* = "B":

$$pvf = {}_nE_x \times (\ddot{a}_{\overline{n}|}^{(m)} + {}_{r|}\ddot{a}_{x+n:n}^{(m)}) + sp \times {}_nE_{xy} \times ({}_{r|}\ddot{a}_{y+n:n}^{(m)} - {}_{r|}\ddot{a}_{xy+n:n}^{(m)})$$

benefitForm = "JSJ" & *DefAssump* = "P":

$$pvf = {}_nE_x \times (\ddot{a}_{\overline{n}|}^{(m)} + {}_{r|}\ddot{a}_{xy+n:n}^{(m)} + sp \times ({}_{r|}\ddot{a}_{x+n:n}^{(m)} + {}_{r|}\ddot{a}_{y+n:n}^{(m)} - 2 \times {}_{r|}\ddot{a}_{xy+n:n}^{(m)}))$$

for *DefAssump* = "N", the expression above is correct if nEx is understood to include the interest discount only.

benefitForm = "JSJ" & *DefAssump* = "B":

$$\text{pvf} = {}_{n}E_{x} \times \ddot{a}_{\overline{n}|}^{(m)} + {}_{n}E_{xy} \times {}_{1}|\ddot{a}_{xy+n:\overline{n}|}^{(m)} + sp \times ({}_{n}E_{x} \times {}_{1}|\ddot{a}_{x+n:\overline{n}|}^{(m)} + {}_{n}E_{xy} \times ({}_{1}|\ddot{a}_{y+n:\overline{n}|}^{(m)} - 2 \times {}_{1}|\ddot{a}_{xy+n:\overline{n}|}^{(m)}))$$

where ${}_{n}E_{x} = v^{0:n}$ if DefAssump = "N"; ${}_{n}E_{x} = v^{0:n}{}_{n}p_{x}$ if DefAssump = "P"; and ${}_{n}E_{xy} = v^{0:n}{}_{n}p_{xy}$ if DefAssump = "B". $v^{0:n}$ is defined as the following:

$$v^{0:n} = [1/(1+i_{k+1})]^{j} \; x \prod_{t=1}^{k} [1/(1+i_{t})]$$

method = "N"

benefitForm = "SLA" & *DefAssump* = "N":

$$\text{pvf} = {}_{n}|\ddot{a}_{\overline{n}|}^{(m)} + {}_{n+1}|\ddot{a}_{x:\overline{n}|}^{(m)} / {}_{n}p_{x}$$

benefitForm = "SLA" & *DefAssump* = "P":

$$\text{pvf} = {}_{n}p_{x} \times {}_{n}|\ddot{a}_{\overline{n}|}^{(m)} + {}_{n+1}|\ddot{a}_{x:\overline{n}|}^{(m)}$$

benefitForm = "JSC" & *DefAssump* = "N":

$$\text{pvf} = {}_{n}|\ddot{a}_{\overline{n}|}^{(m)} + {}_{n+1}|\ddot{a}_{x:\overline{n}|}^{(m)} / {}_{n}p_{x} + sp \times ({}_{n+1}|\ddot{a}_{y:\overline{n}|}^{(m)} / {}_{n}p_{y} - {}_{n+1}|\ddot{a}_{xy:\overline{n}|}^{(m)} / ({}_{n}p_{x} {}_{n}p_{y}))$$

benefitForm = "JSC" & *DefAssump* = "P":

$$\text{pvf} = {}_{n}p_{x} \times {}_{n}|\ddot{a}_{\overline{n}|}^{(m)} + {}_{n+1}|\ddot{a}_{x:\overline{n}|}^{(m)} + sp \times ({}_{n}p_{x} \times {}_{n+1}|\ddot{a}_{y:\overline{n}|}^{(m)} / {}_{n}p_{y} - {}_{n+1}|\ddot{a}_{xy:\overline{n}|}^{(m)} / {}_{n}p_{y})$$

benefitForm = "JSC" & *DefAssump* = "B":

$$\text{pvf} = {}_{n}p_{x} \times {}_{n}|\ddot{a}_{\overline{n}|}^{(m)} + {}_{n+1}|\ddot{a}_{x:\overline{n}|}^{(m)} + sp \times ({}_{n}p_{x} \times {}_{n+1}|\ddot{a}_{y:\overline{n}|}^{(m)} - {}_{n+1}|\ddot{a}_{xy:\overline{n}|}^{(m)})$$

benefitForm = "JSJ" & *DefAssump* = "N":

$$\text{pvf} = {}_{n}|\ddot{a}_{\overline{n}|}^{(m)} + {}_{n+1}|\ddot{a}_{xy:\overline{n}|}^{(m)} / ({}_{n}p_{x} {}_{n}p_{y}) + sp \times ({}_{n+1}|\ddot{a}_{x:\overline{n}|}^{(m)} / {}_{n}p_{x} + {}_{n+1}|\ddot{a}_{y:\overline{n}|}^{(m)} / {}_{n}p_{y} - 2 \times {}_{n+1}|\ddot{a}_{xy:\overline{n}|}^{(m)} / ({}_{n}p_{x} {}_{n}p_{y}))$$

benefitForm = "JSJ" & *DefAssump* = "P":

$$pvf = {}_{n}p_x \times {}_{n}|\ddot{a}_{\overline{t}|}^{(m)} + {}_{n+1}|\ddot{a}_{xy:\overline{t}|}^{(m)} / {}_{n}p_y + sp \times ({}_{n+1}|\ddot{a}_{x:\overline{t}|}^{(m)} + {}_{n}p_x \times {}_{n+1}|\ddot{a}_{y:\overline{t}|}^{(m)} / {}_{n}p_y - 2 \times {}_{n+1}|\ddot{a}_{xy:\overline{t}|}^{(m)} / {}_{n}p_y)$$

benefitForm = "JSJ" & *DefAssump* = "B":

$$pvf = {}_{n}p_x \times {}_{n}|\ddot{a}_{\overline{t}|}^{(m)} + {}_{n+1}|\ddot{a}_{xy:\overline{t}|}^{(m)} + sp \times ({}_{n+1}|\ddot{a}_{x:\overline{t}|}^{(m)} + {}_{n}p_x \times {}_{n+1}|\ddot{a}_{y:\overline{t}|}^{(m)} - 2 \times {}_{n+1}|\ddot{a}_{xy:\overline{t}|}^{(m)})$$

benefitForm = "CTN" & *DefAssump* = "N":

$$pvf = {}_{n}|\ddot{a}_{\overline{t}|}^{(m)}$$

benefitForm = "CTN" & *DefAssump* = "P":

$$pvf = {}_{n}p_x \times {}_{n}|\ddot{a}_{\overline{t}|}^{(m)}$$

Note Linear Interpolations for certainPeriod and temporaryPeriod:

The Woolhouse method linearly interpolates the results for fractional years between the integers above and below it for certain and temporary period.

For the current function NPVF2 we use the methodology below when both the certainPeriod and temporaryPeriod are not divisible by 12 and Woolhouse is specified:

C = Certain Period

T = Temporary Period

L = Total Length of Annuity (C + T)

C1 = MIN (ROUNDDOWN (C/12, 0) * 12, L) C2 =MIN (ROUNDUP (C/12, 0) * 12, L)

T1 = L – C1

T2 = L – C2

A1 = Annuity with Certain Period set to C1 and Temporary Period set to T1

Note If T1 = 0, compute as a Certain Only annuity

A2 = Annuity with Certain Period set to C2 and Temporary Period set to T2

Note If T2 = 0, compute as a Certain Only annuity

Factor = A1 + ((A2 - A1) * ((C – C1) / (C2 – C1)))

For the retired function NPVF we used the methodology below when both the certainPeriod and temporaryPeriod are not divisible by 12 and Woolhouse is specified:

If both the certainPeriod and temporaryPeriods are for fractional years, the standard double, or two-dimensional, linear interpolation method is used. Specifically, if c is the number of months in the certainPeriod and t is the number of months in the temporaryPeriod and a(c,t) is the annuity with respect to the variables c and t, then a(c,t) has the following expression:

$$a(c,t) = \{t_1 \times \{c_1 \times a([c],[t]) + c_2 \times a([c]+12,[t])\} / 12 + t_2 \times \{c_1 \times a([c],[t]+12) + c_2 \times a([c]+12,[t]+12)\} / 12\} / 12$$

Where $[c] = integer(c/12) \times 12$, $[t] = integer(t/12) \times 12$, $c_1 = 12 - c + [c]$, $c_2 = c - [c]$, $t_1 = 12 - t + [t]$ and $t_2 = t - [t]$.

Example

09/29/2014

Example 1

Calculate a deferred (to age 65) straight life annuity present value factor using PBGC's annuity interest rate structure, where the male participant's age is 55 years and the monthly Woolhouse formula is used; use the GAM male 1983 mortality table for male mortality and the GAM male 1983 mortality table set back 6 years for female mortality; assume the DOPT is 1/1/2005 and contained in the MS Excel cell A1:

=NPVF2("MP", "SLA", "N", A1, "M", 55, 65, 0, 0, 0, 0, "GM83", "GM83M6", "P", "", "") **returns 6.90543533057263**

Using the interest rate structure in cells A1:B2 which applies to a 1/1/2005 DOPT yields the same result as the previous version:

0.0410 20

0.0475 999

=NPVF2("MP", "SLA", "N", A1:B2, "M", 55, 65, 0, 0, 0, 0, "GM83", "GM83M6", "P", "", "") **returns 6.90543533057263**

Following is the same example except that the DOPT in cell A1 is 1/1/2010 and the mortality tables reflect PBGC's annuity present value factor assumptions for a 2010 DOPT:

=NPVF2("MP", "SLA", "N", A1, "M", 55, 65, 0, 0, 0, 0, "2M10", "2F10", "P", "", "") **returns 7.047230382**

Using the interest rate structure in cells A1:B2 which applies to a 1/1/2010 DOPT yields the same result as the previous function:

0.0489 20

0.0463 999

=NPVF2("MP", "SLA", "N", A1:B2, "M", 55, 65, 0, 0, 0, 0, "2M10", "2F10", "P", "", "") **returns 7.04723082**

Example 2

Calculate a deferred (to age 60) joint and 50% survivor contingent annuity present value factor using PBGC's lump sum interest rate structure, where the male participant's age is 55 years, the beneficiary's

age at XRD is 56, and the monthly Woolhouse formula is used; use the "UP84" mortality table for male and female mortality; the DOPT is 1/1/2005 and contained in the MS Excel cell A1;

results are shown using just the participant's mortality during the deferral period, both the participant's and beneficiary's mortality during the deferral period, and no mortality during the deferral period:

=NPVF2("MP", "JSC", "O", A1, "M", 55, 60, 56, 0.5, 0, 0, "UP84", "UP84", "P", "", "") **returns 12.2785308881802**

=NPVF2("MP", "JSC", "O", A1, "M", 55, 60, 56, 0.5, 0, 0, "UP84", "UP84", "B", "", "") **returns 12.2197621180637**

=NPVF2("MP", "JSC", "O", A1, "M", 55, 60, 56, 0.5, 0, 0, "UP84", "UP84", "N", "", "") **returns 12.9707113007911**

Using the interest rate structure in cells A1:B4 which applies to a 1/1/2005 DOPT yields the same result as the previous function:

0.0300 0.05

1.0400 7

1.0400 8

1.0400 999

=NPVF2("MP", "JSC", "O", A1:B4, "M", 55, 60, 56, 0.5, 0, 0, "UP84", "UP84", "P", "", "") **returns 12.2785308881802**

=NPVF2("MP", "JSC", "O", A1:B4, "M", 55, 60, 56, 0.5, 0, 0, "UP84", "UP84", "B", "", "") **returns 12.2197621180637**

=NPVF2("MP", "JSC", "O", A1:B4, "M", 55, 60, 56, 0.5, 0, 0, "UP84", "UP84", "N", "", "") **returns 12.9707113007911**

Example 3

Calculate an immediate 60-month certain annuity present value factor using the Method N interest rate structure where the participant's age is 65, the monthly Woolhouse formula; use the GAM male 1983 mortality table for male mortality and use the GAM male 1983 mortality table set back 6 years for female mortality; assume the interest rates are contained in the MS Excel range A1:B3 as set forth below:

0.0400 10

0.0500 15

0.0600 999

=NPVF2("MP", "CTN", "N", A1:B3, "M", 65, 65, 0, 0, 60, 0, "GM83", "GM83M6", "P", "", "") **returns 4.54770052603733**

Example 4

Calculate an immediate 60-month temporary annuity present value factor where the participant's age is 65 using Method N interest rate structure and the monthly Woolhouse formula; use the GAM male 1983 mortality table for male mortality and use the GAM male 1983 mortality table set back 6 years for female mortality; assume the interest rates are contained in the MS Excel range A1:B3 as set forth below:

0.0400	10
0.0500	15
0.0600	999

=NPVF2("MP", "SLA", "N", A1:B3, "M", 65, 65, 0, 0, 0, 60, "GM83", "GM83M6", "P", "", "") **returns 4.35788348698677**

Example 5

Calculate an immediate joint and 50% survivor (joint basis where the benefit is reduced by 50% upon the death of either the participant or the beneficiary) annuity present value factor using PBGC's lump sum interest rate structure, where the male participant's age is 60 years and the beneficiary's age at XRD is 56; use the monthly Woolhouse formula and "UP84" mortality table for male and female mortality; assume the interest rates are contained in the MS Excel range A1:B4 as set forth below; results are shown using just the participant's mortality during the deferral period:

0.0400	0.05
1.0500	7
1.0600	8
1.0700	999

=NPVF2("MP", "JSJ", "O", A1:B4, "M", 60, 60, 56, 0.5, 0, 0, "UP84", "UP84", "P", "", "") **returns 13.2060529162824**

Example 6

Calculate a deferred (to age 65) 120 months certain joint and 50% survivor (contingent basis) annuity present value factor using the Method N interest rate structure, where the male participant's age is 55 years and 6 months and the spouse's age is 54 years and 3 months, and the monthly exact formula is used; use the GAM male 1983 mortality table for male mortality and use the GAM male 1983 mortality table set back 6 years for female mortality; assume the interest rates are contained in the MS Excel range A1:B3 as set forth below:

0.0400	10
0.0500	15
0.0600	999

=NPVF2("MX", "JSC", "N", A1:B3, "M", 55.5, 65, 63.75, 0.5, 120, 0, "GM83", "GM83M6", "P", "", "") **returns 8.01475978584078** for the annuity without generation mortality.

=NPVF2("MX", "JSC", "N", A1:B3, "M", 55.5, 65, 63.75, 0.5, 120, 0, "GM83", "GM83M6", "P", "CU", "CU") **returns 8.28114687535519** for the annuity using projection scale "C unisex" for the generation mortality.

Following is the same example except that the annuity type is a non-standard 120 months certain joint and 50% survivor (contingent basis):

=NPVF2("MX", "JSN", "N", A1:B3, "M", 55.5, 65, 63.75, 0.5, 120, 0, "GM83", "GM83M6", "P", "", "") **returns 7.77555314559232** for the annuity without generation mortality.

=NPVF2("MX", "JSN", "N", A1:B3, "M", 55.5, 65, 63.75, 0.5, 120, 0, "GM83", "GM83M6", "P", "CU", "CU") **returns 8.0723500985287** for the annuity using projection scale "C unisex" for the generation mortality.

Example 7

Calculate a deferred (to age 60) 120 months certain life annuity present value factor using PBGC's lump sum interest rate structure, where the male participant's age is 45 years, and the monthly Woolhouse formula is used; use the "UP84" mortality table for male and female mortality; assume the interest rates are contained in the MS Excel range A1:B4 as set forth below:

0.0400	0.05
1.0500	7
1.0600	8
1.0700	999

=NPVF2("MP", "SLA", "O", A1:B4, "M", 45, 60, 0, 0, 120, 0, "UP84", "UP84", "P", "", "") **returns 5.27550742756991** for the annuity without generation mortality.

=NPVF2("MP", "SLA", "O", A1:B4, "M", 45, 60, 0, 0, 120, 0, "UP84P1", "UP84M4", "P", "CU", "CU") **returns 5.4881494598917** for the annuity setting the male mortality table forward 1 year and setting the female mortality table back 4 years, and using projection scale "C unisex" for the generation mortality.

Example 8

Calculate an immediate straight life annuity present value factor using PBGC's annuity interest rate structure for a disabled 55 year old participant; the DOPT is 1/1/2010 and contained in the MS Excel cell A1; results are shown for a disabled participant not receiving Social Security disability benefits and then receiving Social Security disability benefits:

=NPVF2("MP", "SLA", "N",A1, "M", 55, 55, 0, 0, 0, 0, A1, A1, "P", "", "", "1") **returns 14.0692611853749**

=NPVF2("MP", "SLA", "N",A1, "M", 55, 55, 0, 0, 0, 0, A1, A1, "P", "", "", "2") **returns 8.85964885532149**

Example 9

Calculate a deferred (to age 65) non-standard 10 years certain joint and 50% survivor annuity present value factor using the 417(e) interest rate structure, where the male participant's age is 55 years and 6 months, and the spouse's age is 63 years and 9 months, and the monthly exact formula is used; use the

RP-2000 mortality table projected to an annuity start date in 2009 for male and female mortality; use the applicable 417(e) interest rate based on a DOPT of 7/1/2009 (assume the date 07/01/2009 is contained in MS Excel cell A1):

= NPVF2("MX", "JSN", "L", A1, "M", 55.5, 65, 63.75, 0.5, 120, 0, "LS00SU2009", "LS00SU2009", "P", "", "", "2009") **returns 7.59616014437333**

Calculate the same annuity described above, but using the applicable 417(e) mortality tables based on a distribution date of 04/01/2010 and a June 1st plan anniversary. Assume the date 04/01/2010 is contained in MS Excel cell A2.

= NPVF2("MX", "JSN", "L", A1, "M", 55.5, 65, 63.75, 0.5, 120, 0, A2, A2, "P", "", "", "0601") **returns 7.59616014437333**

Example 10

Calculate a future present value factor to convert a cash balance to a straight life annuity using the PPA-06 417(e) interest rate structure for a participant who was 55.5 at DOPT; the DOPT is 10/1/2009 and contained in the MS Excel cell A1 and the future distribution date is 4/1/2010, which is contained in cell A2.

= NPVF2("MX", "SLA", "L", A1, "M", 55.5, 65, 0, 0, 0, 0, A2,A2, "P", "", "", "0601", 55.5) **returns 7.39245545661035**

Error
09/24/2018

COLA is specific with the one of the exact calculation methods (AX, SX, QX, MX)

COLA is less than 0 or greater 1

annuityType is not one of AX, SX, QX, MX, SP, QP, or MP

benefitForm is not one of JSC, JSJ, SLA, CTN or JSN method is not one of O, N or L

doptIntRate

When date entered:

Error if date is invalid or out of range

Error when method is equal to “L” and if date is invalid or out of range or planYrorhealthStat is missing or contains a value not found in table

When range entered:

Error if range does not meet standard

sex is not M or F

If *age* < 0 or *age* > *xra* or if *annuityType* = SP, QP, MP and *xra* – *anb* is not an integer value If *xra* < 0 or if *annuityType* = SP, QP, MP and *xra* – *anb* is not an integer value

If *sxra* < 0 or if *annuityType* = SP, QP, MP and *sxra* – *anb* is not an integer value If *spc* < 0 or *spc* >= 50

If *spc* > 1 and *benefitForm*= "JSN"

If *certainPeriod* < 0 or if *xra* + *certainPeriod* /12 > last age where the probability of dying is less than 1

If *temporaryPeriod* < 0 or if *xra* + *temporaryPeriod* /12 > last age where the probability of dying is less than 1

If table name is entered for *maleTableName* or *femaleTableName* parameter and if it is not a valid table, offset or projection

If date is entered for *maleTableName* or *femaleTableName* parameter and if invalid date or out of range or when method is equal to

N and *healthCode* parameter is missing or not equal to '0', '1' or '2' *deferralAssump* is not one of 'P' or 'N' when *benefitForm* = "SLA" or "CTN" *deferralAssump* is not one of 'B', 'P' or 'N' when *benefitForm* = "JSC" or "JSJ" *maleGeneration* is not equal to "" or valid projection scale *femaleGeneration* is not equal to "" or valid projection scale

If *method* = "N" and date is entered for *maleTableName* or *femaleTableName* and if *planYrorhealthStat* is missing or it is not equal to '0', '1' & '2'

If *method* = "L" and date is entered for *doptIntRate* and *planYrorhealthStat* is missing or invalid value

If *method* = "O" and *planYrorhealthStat* is not NULL

If *method* = "N" and a table name is entered for both *maleTableName* and *femaleTableName* parameters

If *method* = "L" and range is entered for *doptIntRate* parameter and *planYrorhealthStat* is not NULL

If *doptAge* < 0 and *doptAge* > *age*

If *method* = "O" or *method* = "N" and *doptAge* is not NULL

TableInd parameter is populated with something other than an integer from 0 to 7 Invalid date entered for DOPT parameter

Invalid value entered for *PreMMortality* or *PreFMortality* parameters

NPVF2_NP

09/24/2018

NPVF2_NP has the same parameters as NPVF2. The only difference between NPVF2 and NPVF2_NP is that with NPVF2_NP the user must enter a range that contains q's for ages 0 to 125 in the mortality parameters (i.e., cannot enter a mortality table code or a date). This function will not be accepted in V1 or VE spreadsheets added to Archive.

Entering a range that contains q's for ages 0 to 125.

For one-dimensional mortality there are two options:

1. The range specified must contain one row and 126 columns (1 x 126) or contain one column and 126 rows (126 x 1). Each cell should contain the q for the applicable age with the first cell containing the q for age 0 and the last cell containing the q for age 125. The q in each cell must be a decimal value greater than or equal to 0 and less than or equal to 1.0.

2. The range specified must contain one row and 127 columns (1 x 127) or contain one column and 127 rows (127 x 1). The first cell in the range must contain "1D|Scale:PP,ProjYear:Y1Y1Y1Y1,BaseYear:Y2Y2Y2Y2" where PP is the code for the one-dimensional mortality improvement scale and Y1Y1Y1Y1 is the 4-digit projection year and Y2Y2Y2Y2 is the base year for the range of q's specified. The optional OFFSET/OffsetAge and GEN tags can be included in the first cell along with the required tags. The remaining 126 cells in the range follow the same rules as those detailed above for the first one-dimensional mortality option. An example of an entry in the first cell is "1D|Scale:AA,ProjYear:2017,BaseYear:2000" which would indicate that the 126 q's in the range specified should be projected forward seventeen years (from the base year of 2000 to the projection year of 2017) using the one-dimensional mortality improvement scale AA to build a one-dimensional mortality table.

For two-dimensional mortality, the range specified must contain one row and 127 columns (1 x 127) or contain one column and 127 rows (127 x 1). The first cell in the range must contain "2D|Scale:PPPP,ValYear:Y1Y1Y1Y1,BaseYear:Y2Y2Y2Y2" where PPPP is the code for the two-dimensional mortality improvement scale and Y1Y1Y1Y1 is the 4-digit valuation year and Y2Y2Y2Y2 is the base year for the range of q's specified. The optional OFFSET/OffsetAge and GEN tags can be included in the first cell along with the required tags. The remaining 126 cells in the range follow the same rules as those detailed above for one-dimensional mortality. An example of an entry in the first cell is "2D|Scale:MP14,ValYear:2018,BaseYear:2016" which would indicate that the 126 q's in the range specified should be projected forward two years (from the base year of 2016 to the valuation year of 2018) using the two-dimensional mortality improvement scale MP14 to build a two-dimensional mortality table.

Entering a range that contains q's for ages 0 to 125 is only available with the function NPVF2_NP. Final V1/VE spreadsheets cannot include the NPVF2_NP function. TRMD will create a mortality table if needed with the q's specified and add it to the ATPBGC database so that the function NPVF2 can be used with the mortality table code for the mortality table that was added to the ATPBGC database.

Errors

09/24/2018

Range of q's must contain exactly 126 values (Error #0185)—not counting first cell that is included for specifying projection with a one-dimensional or two-dimensional mortality improvement scale.

Range must be a single row or a single column (Error #0186). Every cell in the range must be numeric (Error #0187).

Every q value must be between 0.0 and 1.0 inclusive (Error #0188).

NPVFSS

09/24/2018

Format

12/28/2020

NPVFSS(SAnnType, SBenForm, SMethod, ObjBRD, sex, age, xra, temporaryPeriod, incScale, SMMortName, SFMortName, deferralAssump, SMGen, SFGen, PHSorPY, TableInd, DOPT, PreMMortality, PreFMortality)

Input

09/24/2018

SAnnType SBenForm: String

This parameter specifies if the death benefit is a pre-retirement or post-retirement benefit. There are two options:

- "PRE": pre-retirement single sum increasing fixed term death benefit
- "POST": post-retirement single sum decreasing fixed term death benefit.

SMethod ObjBRD sex: String

This parameter specifies the participant's sex ("M" or "F").

age: Float

This parameter specifies the participant's age at which NPVFSS is calculated. It is rounded to the nearest month.

xra: Float

If *SBenForm* is "PRE", this parameter specifies the participant's age at which the benefit is ended; if *SBenForm* is "POST", this parameter specifies the deferred participant's age at which the plan benefit payable to the participant is started. It is rounded to the nearest month.

temporaryPeriod: Integer

If *SBenForm* is "PRE", this parameter specifies the number of months from the effective date of the death benefit (usually DOPT) to the expected retirement date (use 0 if there is no period restriction); if *SBenForm* is "POST", this parameter specifies a temporary period (decreasing term in months) on or after the expected retirement date.

IncScale: Float

The *IncScale* parameter specifies the interest rate at which the single sum increases each year. For example, 0.05.

SMMortName and *SFMortName DefAssump*: String

This parameter specifies the mortality assumption during the deferral period and is defined as follows: "N": does not include mortality of participant or beneficiary;

"P": includes the participant's mortality only;

SMGen and *SFGen PHSorPY* (optional)

TableInd (optional)

DOPT (optional) – must be populated when using 417(e)mortality for years after 2018, so that the correct projection scale is used with the 2006 base table.

PreMMortality (optional) and *PreFMortality* (optional)

Algorithm

09/24/2018

SBenForm = "PRE":

In order to simplify the expressions, the following naming conventions are used:

t = *temporaryPeriod*

x = participant's age

px = participant's deferred age

n = *px x t*

m = 1 if *annuityType* = "AX"

m = 2 if *annuityType* = "SX"

m = 4 if *annuityType* = "QX"

m = 12 if *annuityType* = "MX"

method = "O"

The death interest rate is used to calculate *pvf* (v = 1 / (1 + death interest rate))

DefAssump = "N":

$$\text{pvf} = \sum_{k=0}^{tm-1} (1+\text{IncScale})^{k/m+1/(2m)} \times v^{n+k/m+1/(2m)} \times ({}_{k/m}p_{x+n} - {}_{(k+1)/m}p_{x+n})$$

DefAssump = "P":

$$\text{pvf} = \sum_{k=0}^{tm-1} (1+\text{IncScale})^{k/m+1/(2m)} \times v^{n+k/m+1/(2m)} \times ({}_{n+k/m}p_{x} - {}_{n+(k+1)/m}p_{x})$$

method = "N"

DefAssump = "N":

$$\text{pvf} = \sum_{k=0}^{tm-1} (1+\text{IncScale})^{k/m+1/(2m)} \times v^{o:n+k/m+1/(2m)} \times ({}_{k/m}p_{x+n} - {}_{(k+1)/m}p_{x+n})$$

DefAssump = "P":

$$\text{pvf} = \sum_{k=0}^{tm-1} (1+\text{IncScale})^{k/m+1/(2m)} \times v^{o:n+k/m+1/(2m)} \times ({}_{n+k/m}p_{x} - {}_{n+(k+1)/m}p_{x})$$

SBenForm = **"POST"**:

In order to simplify the expressions, the following naming conventions are used:

t = *temporaryPeriod*

i = nearest integer of *temporaryPeriod*

x = participant's age

px = participant's deferred age

n = *px* - *x*

m = 1 if *annuityType* = "AX"

m = 2 if *annuityType* = "SX" or "SP"

m = 4 if *annuityType* = "QX" or "QP"

m = 12 if *annuityType* = "MX" or "MP"

Note Linear Interpolations for temporaryPeriod*:*

The Approximation method linearly interpolates the results for fractional year between the integers above and below it for temporary period.

If t is the number of months in the temporaryPeriod *and a(t) is the annuity with respect to the variable t, then a(t) has the following expression:*

$$a(t) = \{t_1 \times a([t]) + t_2 \times a([t]+12)\} / 12$$

$$\text{Where } [t] = integer(t/12) \times 12,\ t_1 = 12 - t + [t] \text{ and } t_2 = t - [t].$$

Exact Formula

method = "O"

$$pvf = {}_nE_x \times \sum_{k=0}^{tm-1} (t - 1 - k)/m \times v^{k/m+1/(2m)} \times ({}_{k/m}p_{x+n} - {}_{(k+1)/m}p_{x+n})$$

where $v = 1/(1 + immediate\ interest\ rate)$, ${}_nE_x = v^n$ if $DefAssump = 0$; ${}_nE_x = v^n\ {}_np_x$ if $DefAssump = 1$.

method = "N"

DefAssump = "N":

$$pvf = \sum_{k=0}^{tm-1} (t - 1 - k)/m \times v^{o:n+k/m+1/(2m)} \times ({}_{k/m}p_{x+n} - {}_{(k+1)/m}p_{x+n})$$

DefAssump = "P":

$$pvf = \sum_{k=0}^{tm-1} (t - 1 - k)/m \times v^{o:n+k/m+1/(2m)} \times ({}_{k/m}p_{x+n} - {}_{(k+1)/m}p_{x+n})$$

Example

Example 1

Calculate a deferred (60 months) pre-retirement single sum increasing (0.05) term death benefit factor using PBGC's current interest rate structure, where the participant's age is 55 years and 6 months and expected retirement age is 65, and the monthly exact formula is used:

=NPVFSS("MX", "PRE", "N", A1:B3, "M", 55.5, 65, 54, 0.05, "GM83", "GM83M6","P", "", "") for the annuity without generation mortality.

=NPVFSS("MX", "PRE", "N", A1:B3, "M", 55.5, 65, 54, 0.05, "GM83", "GM83M6", "P", "CU", "CU") for the annuity using projection scale "C unisex" for the generation mortality.

Example 2

Calculate a deferred (114 months) and 10 years temporary post-retirement single sum decreasing term death benefit factor using PBGC's current interest rate structure, where the participant's age is 55 years and 6 months, and the monthly exact formula is used:

=NPVFSS("MX", "POST", "N", A1:B3, "M", 55.5, 65, 120, "GM83", "GM83M6", "P", "", "") for the annuity without generation mortality.

=NPVFSS("MX", "POST", "N", A1:B3, "M", 55.5, 65, 120, "GM83", "GM83M6", "P", "CU", "CU") for the annuity using projection scale "C unisex" for the generation mortality.

NPVFSS_NP

09/24/2018

NPVFSS_NP has the same parameters as NPVFSS. The only difference between NPVFSS and NPVFSS_NP is that with NPVFSS_NP the user must enter a range that contains q's for ages 0 to 125 in the mortality parameters (i.e., cannot enter a mortality table code or a date). This function will not be accepted in V1 or VE spreadsheets added to Archive.

Entering a range that contains q's for ages 0 to 125

For one-dimensional mortality there are two options:

1. The range specified must contain one row and 126 columns (1 x 126) or contain one column and 126 rows (126 x 1). Each cell should contain the q for the applicable age with the first cell containing the q for age 0 and the last cell containing the q for age 125. The q in each cell must be a decimal value greater than or equal to 0 and less than or equal to 1.0.

2. The range specified must contain one row and 127 columns (1 x 127) or contain one column and 127 rows (127 x 1). The first cell in the range must contain "1D|Scale:PP,ProjYear:Y1Y1Y1Y1,BaseYear:Y2Y2Y2Y2" where PP is the code for the

one-dimensional mortality improvement scale and Y1Y1Y1Y1 is the 4-digit projection year, and Y2Y2Y2Y2 is the base year for the range of q's specified. The optional OFFSET/OffsetAge and GEN tags can be included in the first cell along with the required tags. The remaining 126 cells in the range follow the same rules as those detailed above for the first one-dimensional mortality option. An example of an entry in the first cell is "1D|Scale:AA,ProjYear:2017,BaseYear:2000", which would indicate that the 126 q's in the range specified should be projected forward seventeen years (from the base year of 2000 to the projection year of 2017) using the one-dimensional mortality improvement scale AA to build a one-dimensional mortality table.

For two-dimensional mortality, the range specified must contain one row and 127 columns (1 x 127) or contain one column and 127 rows (127 x 1). The first cell in the range must contain "2D|Scale:PPPP,ValYear:Y1Y1Y1Y1,BaseYear:Y2Y2Y2Y2" where PPPP is the code for the two-dimensional mortality improvement scale and Y1Y1Y1Y1 is the 4-digit valuation year and Y2Y2Y2Y2 is the base year for the range of q's specified. The optional OFFSET/OffsetAge and GEN tags can be included in the first cell along with the required tags. The remaining 126 cells in the range follow the same rules as those detailed above for one-dimensional mortality. An example of an entry in the first cell is "2D|Scale:MP14,ValYear:2018,BaseYear:2016", which would indicate that the 126 q's in the range specified should be projected forward two years (from the base year of 2016 to the valuation year of 2018) using the two-dimensional mortality improvement scale MP14 to build a two-dimensional mortality table.

Entering a range that contains q's for ages 0 to 125 is only available with the function NPVFSS_NP. Final V1/VE spreadsheets cannot include the NPVFSS_NP function. TRMD will create a mortality table if needed with the q's specified and add it to the ATPBGC database so that the function NPVFSS can be used with the mortality table code for the mortality table that was added to the ATPBGC database.

Errors

09/24/2018

Range of q's must contain exactly 126 values (Error #0185)—not counting first cell that is included for specifying projection with a one-dimensional or two-dimensional mortality improvement scale.

Range must be a single row or a single column (Error #0186). Every cell in the range must be numeric (Error #0187).

Every q value must be between 0.0 and 1.0 inclusive (Error #0188).

QPSAPVF

09/30/2016

QPSAPVF computes the present value factor for determining the liability of the QPSA benefit that is included in the total liability for married (or assumed to be married) participant records in which the expected retirement age is greater than the age nearest birthday at DOPT in plans that do not charge for the QPSA coverage (i.e. there is no reduction to the accrued benefit for the QPSA coverage).

Format

02/26/2016

QPSAPVF(*AnnType, BenForm, DOPT, PHS, PSex, SSex, ANB, XRA, SANB, SXRA, CertainPeriod, TemporaryPeriod, COLARate*)

Input

02/26/2016

AnnType

BenForm

DOPT: Excel date

This parameter specifies the *DOPT* for the plan (determines method, interest rate, and mortality used for the calculation).

PHS

PSEX: string

This parameter specifies the gender of the participant (*PSEX* field). Enter "M" or "F".

SSEX: string

This parameter specifies the gender of the spouse (*SSEX* field). Enter "M" or "F".

ANB: number

This parameter specifies the participant's age nearest birthday at *DOPT* (*ANB* field).

XRA: number

This parameter specifies the participant's expected retirement age (*XRA* field).

SANB: number

This parameter specifies the spouse's age nearest birthday at *DOPT* (*SANB* field).

SXRA: number

This parameter specifies the spouse's expected retirement age (*SXRA* field).

CertainPeriod: number

This parameter specifies the months certain in the QPSA form of annuity (MTHS_QPSA field).

TemporaryPeriod: number

This parameter specifies the months temporary for the QPSA form of annuity (TEMP_QPSA field) in the scenario in which the QPSA is paid as a temporary annuity (e.g. a deferred offset reduces the the QPSA benefit to $0.00).

COLARate: number

This parameter specifies the Cost of Living Adjustment (applied post deferral period) (optional parameter)

The COLA rate must be entered as a decimal value from 0 to 1. If a deferral period is specified (ANB < XRA), the interest rate during the deferral period is not offset (the assumption is that the COLA is only applicable once the benefit commences). The function only supports calculation with a COLA when the calculation method is Woolhouse and the DOPT is on or after 11/01/1993 (select and ultimate interest rate structure). Also, the calculation is being made based on the assumption that the COLA increase is annual and that the first increase occurs one year following date of retirement.

Example

02/26/2015

=QPSAPVF("MP", "SLA", DATE(2015, 6, 15), "0", "M", "F", 48, 55, 44, 51, 0, 0)

Errors

09/30/2016

Invalid or missing value in *AnnType* parameter.

Invalid or missing value in *BenForm* parameter.

Date in *DOPT* parameter is before 09/02/1974 or after last date available in the ATPBGC database or missing value in *DOPT* parameter.

Invalid or missing value in *PHS* parameter.

Invalid or missing value in *PSEX* parameter.

Invalid or missing value in *SSEX* parameter.

ANB greater than *XRA*.

SANB greater than *SXRA*.

Absolute value of [(*XRA* - *ANB*) - (*SXRA* - *SANB*)] is greater than 1.

Deferral period either *XRA* – *ANB* or *SXRA* – *ANB* is not an integer value with an *AnnType* value that specifies Woolhouse.

CertainPeriod is less than 0 or too large (certain period extends past end of mortality table).

TemporaryPeriod is less than 0 or too large (temporary period extends past end of mortality table).

CertainPeriod plus *TemporaryPeriod* (temporary annuity with a certain period) is too large (total extends past end of mortality table).

COLARate greater than 0 and *AnnType* value does not specify Woolhouse.

COLARate is less than 0 or greater than 1.

NPVFEEC

09/28/2017

Note The NPVFEEC function has been deprecated and is only retained for backward compatibility with old cases.

NPVFEEC performs the present value factor calculation for a pre-retirement single sum death benefit for returning employee's contributions. The value of NPVFEEC is not rounded.

Format

02/26/2016

NPVFEEC(*sex, age, xra, temporaryPeriod, SMMortName, SFMortName, deferralAssump, maleGeneration, femaleGeneration*)

Input

09/29/2014

sex: String

This parameter specifies the participant's sex ("M" or "F").

age: Float

This parameter specifies the participant's age at which NPVFEEC is calculated. It is rounded to the nearest month.

xra: Float

This parameter specifies the deferred participant's age at which the plan benefit payable to the participant is started. It is rounded to the nearest month.

temporaryPeriod: Integer

This parameter specifies the number of months from the effective date of the death benefit (usually DOPT) to the expected retirement date (usually XRD), use 0 if there is no period restriction.

SMMortName and *SFMortName*

DefAssump: String

This parameter specifies the mortality assumption during the deferral period and is defined as follows:

- "N": does not include mortality of participant or beneficiary.

- "P": includes the participant's mortality only.

SMGen and *SFGen*

Algorithm

In order to simplify the expressions, the following naming conventions are used:

t = temporaryPeriod

x = participant's age

px = participant's deferred age when death benefit coverage starts

n = px - x - t/12; years until death benefit coverage starts

DefAssump = "N":

$$pvf = 1 - {}_{t/12}p_{x+n}$$

DefAssump = "P":

$$pvf = 1 - {}_{n+t/12}p_{x}$$

Example

09/29/2014

To calculate a pre-retirement single sum fixed term death benefit factor for returning employee contributions, where the participant's age is 55 years and 6 months and expected retirement age is 65:

=NPVFEEC("M", 55.5, 65, 54, "GM83", "GM83M6", "P", "", "") for the annuity without generation mortality.

=NPVFEEC("M", 55.5, 65, 54, "GM83", "GM83M6", "P", "CU", "CU") for the annuity using projection scale "C unisex" for the generation mortality.

PBGCOFAVAL

02/26/2016

PBGCOFAVAL calculates the optional form of annuity value given the present value of the benefit under the existing plan. This function is the simpler of the two optional form of annuity functions (the more complex form is PBGCOFA).

Format

02/26/2016

PBGCOFAVAL(*dopt, dob, sdob, bdob, NonSpouseInd, dor, Value, PBGCSLA, PBGCForm*)

Input

09/29/2014

dopt: Excel date

This parameter specifies the date of plan termination.

dob: Excel date

This parameter specifies the participant's date of birth.

sdob: Excel date

This parameter specifies the spouse's date of birth. This parameter is ignored if *NonSpind* is set to "Y".

bdob: Excel date

This parameter specifies the beneficiary's date of birth. This parameter is ignored if *NonSpind* is set to "N".

NonSpouseInd: string

This parameter indicates whether to use *sdob* (if set to "N") or *bdob* (if set to "Y").

dor: Excel date

This parameter specifies the date of retirement.

Value: float

This parameter specifies the present value of the benefit in single or married form.

PBGCSLA: float

This parameter specifies the monthly benefit in the PBGC option SLA form. The result is limited to this amount if *PBGCForm* is equal to "JS50", "JS75", "JS100", or "JSPOP". If the beneficiary is a non-spouse (as indicated by the *NonSpind* parameter) and the PBGC joint life optional benefit is less than *PBGCSLA*, then the result of the function is 0.

PBGCForm: string

This parameter specifies the PBGC optional form to which the benefit is being converted. It must be one of "SLA", "5CC", "10CC", "15CC", "JS50", "JS75", "JS100", or "JSPOP".

Example

09/29/2014

=PBGCOFAVAL(DATE(2002, 4, 1), DATE(1945, 2, 15), DATE(1948, 10, 3), DATE(1972, 3, 22), "N", DATE(2010, 3, 1), 20000, 0, "JS50")

PBGCOFA

09/28/2017

PBGCOFA calculates the PBGC optional form of annuity specified or the value of the plan benefit given the amount and form of the plan benefit. This function is the more complex of the two optional form of annuity functions (the simpler form is PBGCOFAVAL). This function allows the actuary to enter the details for the plan form including the benefit amount, form of annuity, and special features (e.g., post-retirement death benefit, Medicare supplement, free surviving spouse benefits, etc.)

The PBGCOFA function has been modified to handle plan benefits with modified cash refund feature. The modified cash refund feature provides a linearly decreasing post-retirement lump sum death

benefit. The post retirement lump sum death benefit is based on the employee contribution balance (in some cases a hypothetical cash balance) at date of retirement and the actual retirement benefit. PBGC includes a value for the post retirement lump sum death benefit when computing the total value of the plan benefit used to determine the PBGC optional form benefit amounts. The new optional parameter being added to the function (ECC Balance) is used for entering the employee contribution balance (or hypothetical cash balance) at date of retirement.

The PBGCOFA function has been enhanced to handle plan benefits that include Medicare supplements payable to the participant and/or beneficiary. PBGC includes the value of the Medicare supplements when determining the total value of the plan benefit used for computing PBGC optional forms of annuity (Medicare supplements are not paid on top of PBGC optional forms of annuity as is the case with temporary supplements). Five new parameters have been added to the PBGCOFA function to allow the user to enter the Medicare Supplement payable to the participant and beneficiary and the start date for each supplement and an indicator to specify whether the Medicare Supplement is payable to both spouse and non-spouse beneficiaries or to only spouse beneficiaries (analogous to free surviving spouse benefit).

Format

09/28/2017

PBGCOFA(*DOPT, DOB, SDOB, BDOB, NonSpind, DOR, AnnTp, BenForm, SrvPct, MthsCert, MthsTemp, MthlyBen, PopupBen, PBGCSLA, PBGCForm, SrvBenInt1, StrtDtInt2, SrvBenInt2, StrtDtInt3, SrvBenInt3, FreeCCMthlyBen, FreeCCEndDate, EECBal, PMedSuppDt, PMedSuppAmt, BMedSuppDt, BMedSuppAmt, BMedSuppInd, AAN, TmpSupp, SuppEnd, CertDeath*)

Input

09/28/2017

DOPT: Excel date

This parameter specifies the date of plan termination—the value must be on or after 10/01/1974.

DOB: Excel date

This parameter specifies the participant's date of birth.

SDOB: Excel date

This parameter specifies the spouse's date of birth. This parameter is ignored if *NonSpind* is set to "Y".

BDOB: Excel date

This parameter specifies the beneficiary's date of birth. This parameter is ignored if *NonSpind* is set to "N".

NonSpind: string

This parameter specifies whether to use *SDOB* (if set to "N") or *BDOB* (if set to "Y").

DOR: Excel date

This parameter specifies the date of retirement.

AnnTp

BenForm

SrvPct: float

This parameter specifies the survivor percentage of the benefit being converted. This parameter must be between 0 and 1.

MthsCert: float

This parameter specifies the number of months in the certain period of the benefit being converted.

MthsTemp: float

This parameter specifies the number of months in the temporary period of the benefit being converted.

MthlyBen: float

This parameter specifies the amount of the monthly benefit being converted.

PopupBen: float

This parameter specifies the amount the monthly benefit pops up to if the beneficiary predeceases the participant.

PBGCSLA: float

This parameter specifies the monthly benefit in the optional PBGC SLA form of annuity. The result from PBGCOFA is limited to the amount entered in the PBGCSLA parameter if the *PBGCForm* parameter is equal to “JS50”, “JS75”, “JS100”, or “JSPOP”. If the beneficiary is a non-spouse (as indicated by the *NonSpind* parameter) and the PBGC joint life optional benefit computed is not greater than 50% of the amount entered in the PBGCSLA parameter, the result from PBGCOFA will be $0 because the PBGC does not permit a participant to elect a PBGC optional form of annuity with a non-spouse beneficiary that is less than PBGCSLA, then the result of the function is 0or equal to 50% of the amount payable in the PBGC optional SLA form of annuity.

PBGCForm: string

This parameter specifies the PBGC optional form to which the benefit is being converted. It must be one of “SLA”, “5CC”, “10CC”, “15CC”, “JS50”, “JS75”, “JS100”, “JSPOP”, or “VALUE”. If this parameter is set to “VALUE”, the function returns the unrounded present value of the existing plan benefit.

The following seven parameters are related to the free surviving spouse benefit and free certain period that are typically features found in steel plans. If there is no free surviving spouse benefit or free certain period, enter 0 for these parameters.

Note It is possible to have free surviving spouse benefits without the free certain period and visa-versa.

SrvBenInt1: float

This parameter specifies the amount of the survivor benefit during the first payment interval. This is used only for the free surviving spouse benefit. Enter 0 if not applicable.

StrtDtInt2: Excel date

This parameter specifies the start date of the second payment interval. This is used only for the free surviving spouse benefit. Enter 0 if not applicable.

SrvBenInt2: float

This parameter specifies the amount of the survivor benefit during the second payment interval. This is used only for the free surviving spouse benefit. Enter 0 if not applicable.

StrtDtInt3: Excel date

This parameter specifies the start date of the third payment interval. This is used only for the free surviving spouse benefit. Enter 0 if not applicable.

SrvBenInt3: float

This parameter specifies the amount of the survivor benefit during the third payment interval. This is used only for the free surviving spouse benefit. Enter 0 if not applicable.

FreeCCMonthlyBen: float

This parameter specifies the amount of the Free C&C benefit. This is used only for the free surviving spouse benefit. Enter 0 if not applicable.

FreeCCEndDate: Excel date

This parameter specifies the Free C&C period ends—enter the date of the first payment following the expiration of the certain period. This is used only for the free surviving spouse benefit. Enter 0 if not applicable.

EECBal: double

The employee contribution or cash balance at DOR. This parameter is optional and should only be populated when there is a post-retirement lump sum death benefit associated with the present value of employee contribution or cash balance (i.e., the plan form has a modified cash refund feature).

The following five parameters are optional and should only be populated when the plan benefit includes a medicare supplement payable to the participant and/or beneficiary.

PMedSuppDt is Start Date for participant's medicare supplement (default value 0)

PMedSuppAmt is Amount for participant's medicare supplement (default value 0)

BMedSuppDt is Start Date for beneficiary's medicare supplement (default value 0)

BMedSuppAmt is Amount for beneficiary's medicare supplement (default value 0)

BMedSuppInd is beneficiary medicare supplement indicator (default value 0)

> 0 – the Medicare Supplement payable to the beneficiary is paid to both spouse and non-spouse beneficiaries.

1 – the Medicare Supplement payable to the beneficiary is paid only to the spouse beneficiary (analogous to FSSB)

Note It is possible to enter a positive Medicare supplement with a $0 monthly benefit in the MthlyBen parameter, i.e., the participant is only entitled to a Medicare supplement. The benefit amount in the PBGC optional form of annuity will be adjusted appropriately if the retirement date is not the same as the start date for the Medicare Supplement.

The following three parameters are optional and should only be populated when the plan benefit is a J&S Pop-up (BenForm is JSP) and there is a limit on the amount of the pop-up due to the accrued at normal limitation while a temporary supplement is being paid.

AAN is the Accrued at Normal Limit and must be greater than or equal to the benefit amount.

TmpSupp is the amount of the temporary supplement.

SuppEnd is the first payment date after the expiration of the supplement.

The following parameter is optional and should only be populated when the plan benefit includes a post-retirement death benefit that adds to the plan benefit a set number of additional certain payments regardless of when the annuitant dies.

CertDeath is the number of certain payments to be made following the participant's death.

Example
04/27/2017

=PBGCOFA(DATE(2009,07,01), DATE(1950,01,01), DATE(1954,08,05), 0, "N", DATE(2012,01,01), "MP", "SLA", 0, 0, 0, 150, 0, 0, "VALUE", 0, 0, 0, 0, 0, 0, 0) **returns 20561.05437**

=PBGCOFA(DATE(2009,07,01), DATE(1950,01,01), DATE(1954,08,05), 0, "N", DATE(2012,01,01), "MP", "SLA", 0, 0, 0, 150, 0, 0, "VALUE", 0, 0, 0, 0, 0, 0, 0, DATE(2015,01,01), 50, DATE(2019,08,05), 40, 1) **returns 26773.52977**

LX
09/24/2018

LX performs the calculation of lx (for example, computing the value of QPSA present value). The value of LX is not rounded.

Format
12/28/2020

LX(*SMortName, Ssex, Dage, SMethod, PHSorPY, TableInd, DOPT, Annuitant*)

Input
12/28/2020

SMortName
sSex: This parameter specifies the gender of the primary and contingent annuitants.

- "M" or "MF": Male primary annuitant and female contingent annuitant.
- "F" or "FM": Female primary annuitant and male contingent annuitant.

- "MM": Male primary annuitant and male contingent annuitant.
- "FF": Female primary annuitant and female contingent annuitant.

Dage: Float
This parameter specifies the participant's age at which LX is calculated. It is rounded to the nearest month.
SMethod– optional parameter but required when a date is entered in the *SMortName* parameter.
PHSorPY- optional parameter but required when a date is entered in the *SMortName* parameter.
TableInd (optional) – The user must take care when using the function to make a calculation for the contingent annuitant of a joint life annuity. Healthy mortality should be used for the contingent annuitant so when using the function to perform calculations for the contingent annuitant, this parameter should be set to '0' (healthy mortality).
DOPT (optional) – must be populated when using 417(e)mortality for years after 2018, so that the correct projection scale is used with the 2006 base table.
Annuitant (optional) – determines whether the result is returned for the participant (P) or the contingent annuitant (C). The default is P.

Algorithm

$$l_0 = 10000;$$
$$l_x = p_{x-1} l_{x-1} \text{ at integral age;}$$
$$l_{x+t/12} = l_x\,(12\text{-}t)/12 + l_{x+1}\,t/12 \text{ at non-integral age.}$$

Example
09/29/2014

=LX("GM83", "M", 55.5)

Errors
09/26/2018

Invalid mortality table entry

Age that is less than 0 or greater than 124 11/12ths

Invalid entry for *Ssex* or missing when *SMortName* is populated Invalid entry for *SMethod* or missing when *SMortName* is populated Invalid entry for *PHSorPY* or missing when *SMortName* is populated *TableInd* parameter is populated with something other than an integer from 0 to 7 Invalid date entered for *DOPT* parameter

QX
09/24/2018

The function QX will return the probability of death during a period of time.

Format
12/28/2020

QX(*SMortName, dAge, dLength, Ssex, SMethod, PHSorPY, TableInd, DOPT, Annuitant*)

Input
12/28/2020

SMortName
dAge is Age, it will accept non-integral ages with values entered rounded to the nearest age in years and completed months
dLength is Length of time (in months)
sSex: This parameter specifies the gender of the primary and contingent annuitants.

- "M" or "MF": Male primary annuitant and female contingent annuitant.
- "F" or "FM": Female primary annuitant and male contingent annuitant.
- "MM": Male primary annuitant and male contingent annuitant.
- "FF": Female primary annuitant and female contingent annuitant.

SMethod – optional parameter but required when a date is entered in the SMortName parameter.
PHSorPY - optional parameter but required when a date is entered in the SMortName parameter.
TableInd (optional) – The user must take care when using the function to make a calculation for the contingent annuitant of a joint life annuity. Healthy mortality should be used for the contingent annuitant so when using the function to perform calculations for the contingent annuitant, this parameter should be set to '0' (healthy mortality).
DOPT (optional) – must be populated when using 417(e)mortality for years after 2018, so that the correct projection scale is used with the 2006 base table.
Annuitant (optional) – determines whether the result is returned for the participant (P) or the contingent annuitant (C). The default is P.

Example
09/29/2014

=QX("UP84", 62, 12) **returns 0.01701**

=QX("UP84M3", 85, 12) **returns 0.096218**

=QX("UP84", 62, 0) **returns 0**

Errors
09/24/2018

Invalid mortality table entry

Age that is less than 0 or greater than 124 11/12ths Months that are less than 0

Non-integer value entered for months

Invalid entry for *Ssex* or missing when *SMortName* is populated

Invalid entry for *SMethod* or missing when *SMortName* is populated

Invalid entry for *PHSorPY* or missing when *SMortName* is populated

TableInd parameter is populated with something other than an integer from 0 to 7

Invalid date entered for *DOPT* parameter

PX

09/24/2018

The function PX will return the probability of survival during a period of time.

Format

12/28/2020

PX(*SMortName, dAge, dLength, Ssex, SMethod, PHSorPY, TableInd, DOPT, Annuitant*)

Return

09/29/2014

The probability of survival during a period of time

Input

12/28/2020

SMortName
dAge is Age, it will accept non-integral ages with values entered rounded to the nearest age in years and completed months
dLength is Length of time (in months)
sSex: This parameter specifies the gender of the primary and contingent annuitants.

- "M" or "MF": Male primary annuitant and female contingent annuitant.
- "F" or "FM": Female primary annuitant and male contingent annuitant.
- "MM": Male primary annuitant and male contingent annuitant.
- "FF": Female primary annuitant and female contingent annuitant.

SMethod – optional parameter but required when a date is entered in the SMortName parameter.
PHSorPY - optional parameter but required when a date is entered in the SMortName parameter.
TableInd (optional) – The user must take care when using the function to make a calculation for the contingent annuitant of a joint life annuity. Healthy mortality should be used for the contingent annuitant so when using the function to perform calculations for the contingent annuitant, this parameter should be set to '0' (healthy mortality).
DOPT (optional) – must be populated when using 417(e)mortality for years after 2018, so that the correct projection scale is used with the 2006 base table.
Annuitant (optional) – determines whether the result is returned for the participant (P) or the contingent annuitant (C). The default is P.

Example

09/29/2014

=PX("UP84", 62, 12) **returns 0.098299**

=PX("UP84M3", 85, 12) **returns 0.0903782**

=PX("UP84", 62, 0) **returns 1**

Errors

09/24/2018

Invalid mortality table entry

Age that is less than 0 or greater than 124 11/12ths

Invalid entry for *Ssex* or missing when *SMortName* is populated

Invalid entry for *SMethod* or missing when *SMortName* is populated

Invalid entry for *PHSorPY* or missing when *SMortName* is populated

TableInd parameter is populated with something other than an integer from 0 to 7

Invalid date entered for *DOPT* parameter

SX

04/27/2017

Format

04/27/2017

SX(*sscalename, projyears, dage, startyear*)

Return

04/27/2017

The mortality improvement factor that can be applied to a q.

Example

04/27/2017

=SX("CU", 4, 55) **returns 0.950929712**

=SX("CU", -4, 55) **returns 1.051602434**

=SX("FP14", 4, 55, 2013) **returns 0.973267979**

=SX("FP14", -4, 55, 2004) **returns 1.049050873**

Parameters

04/27/2017

sscalename is the Projection Scale Code—the one-dimensional projection scales (two-character codes) are in the PROJ_SCALE table in the ATPBGC database, and the two-dimensional projection scales (four-character codes) are in the MORT_IMPRVMT_SCALE table in the ATPBGC database.

projyears is the Years of Projection—the years of improvement. If a non-integer value is entered, an error code will be returned. The function supports a negative value in this parameter, which returns a factor that can be used to remove mortality improvement (equivalent to dividing out an improvement factor). The q should always be multiplied by the value returned.

dage is the Age—the age for the q value. If a value less than 0, a non-integer value, or a value that is greater than the last age contained in the projection scale specified is entered, an error code will be returned.

startyear is the Base Year—the base year of the q value. The entry must be a 4-digit year, YYYY. If a value less than 1900 is entered, an error code will be returned. This is an optional parameter and should be

populated only when a two-dimensional projection scale is specified in the *sscalename* parameter. An error code will be returned if this parameter is populated when a one-dimensional projection scale is specified in the *sscalename* parameter, and an error code will be returned if this parameter is not populated when a two-dimensional mortality table is specified in the *sscalename* parameter.

Note When a one-dimensional projection scale code is entered in the sscalename parameter, the function returns Sx ^ N, where Sx is the improvement factor for the age entered in the dage parameter and N is the years of improvement entered in the projyears parameter. If 0 is entered in the projyears parameter, the function will return 1.0.

Note When a two-dimensional projection scale code is entered in the sscalename parameter:

If zero is entered in the *projyears* parameter, *Sx* – (Year) is the improvement factor for the age entered in the *dage* parameter and the year entered in the *startyear* parameter. If the year is not covered by the two-dimensional projection scale entered in the *sscalename* parameter, the function will return the improvement factor that would be used for that year (i.e., the improvement factor for the last year or first year covered by the two-dimensional projection scale entered in the *sscalename* parameter).

If a positive value is entered in the *projyears* parameter, *Sx* – (Year + 1) * *Sx* – (Year + 2) * …… * *Sx* – (Year + N), where *Sx* – (Year + 1) is the improvement factor for the age entered in the *dage* parameter and the year entered in the *startyear* parameter plus one, where *Sx* – (Year + 2) is the improvement factor for the age entered in the *dage* parameter and for the year entered in the *startyear* parameter plus two, …., where *Sx* – (Year + n) is the improvement factor for the age entered in the *dage* parameter and for the year entered in the *startyear* parameter plus the years of improvement entered in the *projyears* parameter. If improvement factors are needed for years not covered by the two-dimensional projection scale entered in the *sscalename* parameter, the function will use the improvement factor for the last year covered by the two-dimensional projection scale entered in the *sscalename* parameter for all years that are after the last year covered by the two-dimensional projection scale entered in the *sscalename* parameter.

If a negative value is entered in the *projyears* parameter, (1 / *Sx* – (Year - 1)) * (1 / *Sx* – (Year - 2))* …… * (1 / *Sx* – (Year + N)), where *Sx* – (Year - 1) is the improvement factor for the age entered in the *dage* parameter and for the year entered in the *startyear* parameter minus one, where *Sx* – (Year - 2) is the improvement factor for the age entered in the *dage* parameter and for the year entered in the *startyear* parameter minus two, …., where *Sx* – (Year + n) is the improvement factor for the age entered in the *dage* parameter and for the year entered in the *startyear* parameter plus the years of improvement (negative value) specified.

Note If improvement factors are needed for years not covered by the two-dimensional projection scale entered in the sscalename parameter, the function will use the improvement factor for the first year covered by the two-dimensional projection scale entered in the sscalename parameter for all years that are before the first year covered by the two-dimensional projection scale entered in the sscalename parameter.

Errors

04/27/2017

Invalid projection scale code entry in *sscalename* parameter

Non-integer value entered in *projyears* parameter

Non-integer value, negative value, or value greater than highest age in projection scale entered in *dage* parameter

startyear parameter populated when a one-dimensional projection scale code is entered in the *sscalename* parameter

startyear parameter not populated when a two-dimensional projection scale code is entered in the *sscalename* parameter

Value less than 1900 entered in *startyear* parameter

VXALL

12/28/2020

VXALL performs the calculation of the interest discounting factor vx. The value of VXALL is not rounded.

Format

12/28/2020

VXALL(*sMethod,xBRD,calcAge,ANB,XRA,ColaRate*)

Input

12/28/2020

sMethod: the type of interest rate structure (“O” or “N”)
xBRD: interest, can be entered as Excel range, literal interest rate, string, or date
calcAge: calculation age
ANB: age
XRA: retirement age
ColaRate (optional): COLA interest rate, applied as an adjustment to the interest rates after retirement

Example

12/28/2020

=VxAll("O",DATE(2017,1,1),55,55,65) **returns 0.115655513**

=VxAll("N",DATE(2017,1,1),55,55,65) **returns 0.360955082**

=VxAll("N",DATE(2017,1,1),70,55,65) **returns 0.273374857**

=VxAll("N",DATE(2017,1,1),70,55,65,0.01) **returns 0.287319722**

IXALL

12/28/2020

The IXALL function returns a single interest rate at a specific calculation age. It can be returned as a monthly, annual, semiannual, or quarterly rate (default is annual). The value of IXALL is not rounded.

Format

12/28/2020

IXALL(*sMethod,xBRD,calcAge,ANB,XRA,PmtType,ColaRate*)

Input
12/28/2020

sMethod: the type of interest rate structure (“O” or “N”)
xBRD: interest, can be entered as Excel range, literal interest rate, string, or date
calcAge: calculation age
ANB: age
XRA: retirement age
PmtType (optional): the period of the interest rate returned; the possible values are:

- A – annual (default)
- S – semiannual
- Q – quarterly
- M – monthly

ColaRate (optional): COLA interest rate, applied as an adjustment to the interest rates after retirement

Example
12/28/2020

=IxAll("O",DATE(2017,1,1),55,60,65) **returns 0.04**

=IxAll("N",DATE(2017,1,1),55,60,65) **returns 0.0187**

=IxAll("N",DATE(2017,1,1),55,60,65,”M”) **returns 0.001545135**

DXYALL
12/28/2020

DXYALL performs the calculation of the Dx commutation function. DXYALL combines the functionality of the DX and DXY functions, and it includes the interest and mortality lookup functionality of the NPVF2 function. The value of DXYALL is not rounded.

Format
12/28/2020

DXYALL(*benform,xBRD,calcAge,ANB,XRA,mMortName,fMortName,pSex,pMethod,sXRA,defAssum,PHS,ColaRate,tableInd,dopt,preMMortality,preFMortality*)

Input
12/28/2020

Benform: “SLA” for single life, “JSJ” for joint life
xBRD: interest, can be entered as Excel range, literal interest rate, string, or date
calcAge: calculation age
ANB: age
XRA: retirement age
mMortName: male mortality, can be table name or date
fMortName: female mortality, can be table name or date
pSex: This parameter specifies the gender of the primary and contingent annuitants.

- "M" or "MF": Male primary annuitant and female contingent annuitant.
- "F" or "FM": Female primary annuitant and male contingent annuitant.

- "MM": Male primary annuitant and male contingent annuitant.
- "FF": Female primary annuitant and female contingent annuitant.

pMethod: the type of interest rate structure (“O” or “N”)
sXRA (optional): spouse retirement age
defAssum (optional): deferral mortality assumption – “P” for participant, “B” for both, and “N” for neither
PHS (optional): participant health status
ColaRate (optional): COLA interest rate, applied as an adjustment to the interest rates after retirement
Tableind (optional): lump sum table indicator, must be an integer between 0 and 7
Dopt (optional): date of plan termination (used for lump sum mortality) – must be populated when using 417(e)mortality for years after 2018, so that the correct projection scale is used with the 2006 base table.
preMMortality (optional): male pre-retirement mortality (if different than post)
preFMortality (optional): female pre-retirement mortality (if different than post)

Example
12/28/2020

=DxyAll("SLA",DATE(2017,1,1),75,55,55,"AA20","AA20","M","N",0,"P") **returns 1821.313631**

=DxyAll("JSJ",DATE(2017,1,1),75,55,55,"AA20","AA20","M","N",71,"B") **returns 3551.270974**

=DxyAll("SLA",0.06,66,55,65,"LS06SU2018","LS06SU2018","M","NPY",62,"P","0701",0.01,2,DATE(2018,8,15)) **returns 194.346083**

NXYALL
12/28/2020

NXYALL performs the calculation of the Nx commutation function. NXYALL combines the functionality of the NX, NXY, NNX, and NNXY functions, and it includes the interest and mortality lookup functionality of the NPVF2 function. The value of NXYALL is not rounded.

Format
12/28/2020

NXYALL(*pAnnType,pBenForm,pMethod,xBRD,pSex,calcAge,ANB,XRA,sXRA,mMortName,fMortName,defAssum,PHS,ColaRate,tableInd,dopt,preMMortality,preFMortality*)

Input
12/28/2020

pAnnType: annuity type
pBenForm: “SLA” for single life, “JSJ” for joint life
pMethod: the type of interest rate structure (“O” or “N”)
xBRD: interest, can be entered as Excel range, literal interest rate, string, or date
pSex: This parameter specifies the gender of the primary and contingent annuitants.

- "M" or "MF": Male primary annuitant and female contingent annuitant.
- "F" or "FM": Female primary annuitant and male contingent annuitant.
- "MM": Male primary annuitant and male contingent annuitant.

- "FF": Female primary annuitant and female contingent annuitant.

calcAge: calculation age
ANB: age
XRA: retirement age
sXRA: contingent annuitant retirement age
mMortName: male mortality, can be table name or date
fMortName: female mortality, can be table name or date
defAssum: deferral mortality assumption – "P" for participant, "B" for both, and "N" for neither
PHS (optional): participant health status
ColaRate (optional): COLA interest rate, applied as an adjustment to the interest rates after retirement
Tableind (optional): lump sum table indicator, must be an integer between 0 and 7
Dopt (optional): date of plan termination (used for lump sum mortality) – must be populated when using 417(e)mortality for years after 2018, so that the correct projection scale is used with the 2006 base table.
preMMortality (optional): male pre-retirement mortality (if different than post)
preFMortality (optional): female pre-retirement mortality (if different than post)

Example
12/28/2020

=NxyAll("MP","SLA","N",DATE(2017,1,1),"M",55,55,65,0,"AA20","AA20","P") **returns 71080.95307**

=NxyAll("MP","JSJ","N",DATE(2017,1,1),"M",55,65,65,71,"AA20","AA20","P") **returns 579915.845**

=NxyAll("MP","JSJ","NPY",0.06,"M",60,55,65,62,"LS06SU2018","LS06SU2018","P","0701",0,0,DATE(2018,8,15)) **returns 35056.9665**

EXYALL
12/28/2020

EXYALL performs the calculation of the Ex commutation function. EXYALL combines the functionality of the EX and NEX functions, and it includes the interest and mortality lookup functionality of the NPVF2 function. The value of EXYALL is not rounded.

Format
12/28/2020

EXYALL(*xBRD,pAge,pXRA,mMortName,fMortName,defAssum,pSex,pMethod,bXRA,PHS,tableInd,dopt*)

Input
12/28/2020

xBRD: interest, can be entered as Excel range, literal interest rate, string, or date
pAge: age
pXRA: retirement age
mMortName: male mortality, can be table name or date
fMortName: female mortality, can be table name or date
defAssum: deferral mortality assumption – "P" for participant, "B" for both, and "N" for neither
pSex: This parameter specifies the gender of the primary and contingent annuitants.

- "M" or "MF": Male primary annuitant and female contingent annuitant.
- "F" or "FM": Female primary annuitant and male contingent annuitant.
- "MM": Male primary annuitant and male contingent annuitant.
- "FF": Female primary annuitant and female contingent annuitant.

pMethod: the type of interest rate structure (“O” or “N”)
bXRA (optional): contingent annuitant retirement age
PHS (optional): participant health status
Tableind (optional): lump sum table indicator, must be an integer between 0 and 7
Dopt (optional): date of plan termination (used for lump sum mortality) – must be populated when using 417(e)mortality for years after 2018, so that the correct projection scale is used with the 2006 base table.

Example
12/28/2020

=ExyAll(DATE(2017,1,1),55,65,"AA20","AA20","P","M","O") **returns 0.631431516**

=ExyAll(DATE(2017,1,1),55,65,"AA20","AA20","P","M","N") **returns 0.776598569**

=ExyAll(0.06,55,65,"LS06SU2018","LS06SU2018","P","M","NPY",62,"0701",0,DATE(2018,8,15)) **returns 0.536223098**

DX
09/28/2017

DX performs the calculation of Dx using PBGC's immediate interest rate (old law). The value of Dx is not rounded.

Format
09/28/2017

DX(*SMortName, ObjBRD, sex, age*)

Input
02/26/2016

SMortName

ObjBRD

sex: String

This parameter specifies the participant's sex ("M" or "F").

age: Float

This parameter specifies the participant's age at which DX is calculated. It is rounded to the nearest month.

Algorithm

$$D_x = v^x l_x$$

Example

08/13/2015

=DX("UP84P1", A1, "M", 55.5)

NX

02/26/2016

NX performs the calculation of $N_x^{(m)}$ using PBGC's immediate interest rate (old law). The value of N_x is not rounded.

Format

02/26/2016

NX(*SAnnType, SMortName, ObjBRD, sex, age*)

Input

08/13/2015

SAnnType

SMortName

ObjBRD

sex: String

This parameter specifies the participant's sex ("M" or "F").

age: Float

This parameter specifies the participant's age at which NX is calculated. It is rounded to the nearest month. Algorithm

The commutation function can be calculated in two different methods: (1) Exact method; and (2) Woolhouse method. The Exact method means it is calculated without any approximation, and the Woolhouse method means it is calculated using the approximation formula.

Exact Formula

$$N_x^{(m)} = \sum_{k=0}^{\infty} v^{x+k/m} l_{x+k/m}$$

where *m* = 1 if *annuityType* = "AX"; *m* = 2 if *annuityType* = "SX"; *m* = 4 if *annuityType* = "QX"; *m* = 12 if *annuityType* = "MX".

Woolhouse Formula

$$N_x^{(m)} = \sum_{k=0}^{\infty} v^{x+k} l_{x+k} - v^x l_x (m-1)/(2m)$$

where *m* = 2 if *annuityType* = "SP"; *m* = 4 if *annuityType* = "QP"; *m* = 12 if *annuityType* = "MP".

Example
09/29/2014

$\ddot{a}_{55:25}^{(12)}$ = =NX("MX", "UP84P1", A1, "M", 55.25) / =DX("MX", "UP84P1", A1, "M", 55.25)

EX
02/26/2016

EX performs the calculation of nEx using PBGC's deferral rates (old law). The value of nEx is not rounded.

Format
02/26/2016

EX(*SMortName, ObjBRD, sex, age, xra*)

Input
02/26/2016

SMortName

The *tableName* parameter specifies the name of the mortality table. This parameter must adhere to the following naming convention:

Sample Mortality Table Code Naming Convention Table	
1	table description (i.e. G=GAM, I=IAM, U=UP, etc.);
2	sex (M, F, U);
3-4	table year (i.e. 71, 83, 84);
5-8	age offset (i.e. M1, P4), or projection (i.e. CU70, DM89);
7-10	projection (i.e. CU70, DM89) if 5-6 contains age offset.

If the age offset is M#, EX sets the table back # years, and if the age offset is P#, EX sets the table forward # years. If the projection is "DM89", EX projects the table to 1989 with male scale D. The algorithm to project the table follows:

$$q_x^{new} = q_x^{old} \times s_x^{\#\ years}$$

Where s is the projection scale. For example, the parameter "GM83M6DF89" means 1) use GAM male 1983 mortality; 2) set age backward 6 years; and 3) project to 1989 using female scale D.

ObjBRD

sex: String

This parameter specifies the participant's sex ("M" or "F").

age: Float

This parameter specifies the participant's age at which EX is calculated. It is rounded to the nearest month.

xra: Float

This parameter specifies the deferred participant's age at which the benefit payable to the participant is started. It is rounded to the nearest month.

Algorithm

$$ {}_{n}E_{x} = v^{0:n}\,{}_{n}p_{x} $$

$v^{0:n}$ is defined as the following:

$$ v^{0:n} = [1/(1+i_{k+1})]^{j} \; x \prod_{t=1}^{k} [1/(1+i_{t})] $$

Where k is the greatest integer such than $k \leq n$, $j = n-k$ (hence $0 \leq j < 1$), and $v^{0,0} = 1$.

Example

09/29/2014

=EX("UP84P1", A1:B4, "M", 55.5, 65)

DXY

02/26/2016

DXY performs the calculation of Dxy using PBGC's immediate interest rate (old law). The value of Dxy is not rounded.

Format

02/26/2016

DXY(*SMMortName, SFMortName, ObjBRD, maleAge, femaleAge*)

Input

02/26/2016

SMMortName and *SFMortName*

ObjBRD

maleAge: Float

This parameter specifies the participant's age at which DXY is calculated. It is rounded to the nearest month.

femaleAge: Float

This parameters specifies beneficiary's age at which DXY is calculated. It is rounded to the nearest month.

Algorithm

$$D_{xy} = v^{x} l_x l_y$$

Example

09/29/2014

=DXY("UP84P1", "UP84M4", A1, 55.5, 51.5)

NXY

02/26/2016

NXY performs the calculation of $N_{xv}^{(m)}$ using PBGC's immediate interest rate (old law). The value of N_{xv} is not rounded.

Format

02/26/2016

NXY(*SAnnType, SMMortName, SFMortName, ObjBRD, maleAge, femaleAge*)

Input

08/13/2015

SAnnType

SMMortName & SFMortName

ObjBRD

maleAge: Float

This parameter specifies the participant's age at which NXY is calculated. It is rounded to the nearest month.

femaleAge: Float

This parameter specifies beneficiary's age at which NXY is calculated. It is rounded to the nearest month.

Algorithm

The commutation function can be calculated in two different methods: (1) Exact method; and (2) Woolhouse method. The Exact method means it is calculated without any approximation, and the Woolhouse method means it is calculated using the approximation formula.

Exact Formula

$$N_{xy}^{(m)} = \sum_{k=0}^{\infty} v^{x+k/m} l_{x+k/m} l_{y+k/m}$$

where *m* = 1 if *annuityType* = "AX"; *m* = 2 if *annuityType* = "SX"; *m* = 4 if *annuityType* = "QX"; *m* = 12 if *annuityType* = "MX".

Woolhouse Formula

$$N_{xy}^{(m)} = \sum_{k=0}^{\infty} v^{x+k} l_{x+k} l_{y+k} - v^{x} l_{x} l_{y} (m-1)/(2m)$$

where *m* = 2 if *annuityType* = "SP"; *m* = 4 if *annuityType* = "QP"; *m* = 12 if *annuityType* = "MP".

Example

09/29/2014

=NXY("MX", "UP84P1", "UP84M4", A1, 55.25, 51.25) /=DXY("UP84P1", "UP84M4", A1, 55.25, 51.25)

NEX

02/26/2016

NEX performs the calculation of ${}_nE_x$ using PBGC's current interest rate structure. The value of ${}_nE_x$ is not rounded.

Format

02/26/2016

NEX(*SMortName, ObjBRD, sex, age, xra*)

Input

09/29/2014

SMortName

ObjBRD

sex: String

This parameter specifies the participant's sex ("M" or "F").

age: Float

This parameter specifies the participant's age at which NEX is calculated. It is rounded to the nearest month.

xra: Float

This parameter specifies the deferred participant's age at which the benefit payable to the participant is started. It is rounded to the nearest month.

Algorithm

$${}_nE_x = v^{0:n}{}_np_x$$

$v^{0:n}$ is defined as the following:

$$v^{0:n} = (1 / (1 + i_{k+1}))^j \times \prod_{t=1}^{k} 1 / (1 + i_t)$$

Where k is the greatest integer such that $k \le n$, $j = n-k$ (hence $0 \le j < 1$), and $v^{0:0} = 1$.

Example

09/29/2014

=NEX("GM83", A1:B4, "M", 55.5, 65)

NNX

02/26/2016

NNX performs the calculation of $N_x^{(m)}$ using PBGC's current interest rate structure. The value of NN_x is not rounded.

Format

02/26/2016

NNX(*SAnnType, SMortName, ObjBRD, sex, age, xra*)

Input

08/13/2015

SAnnType

SMortName

ObjBRD

sex: String

This parameter specifies the participant's sex ("M" or "F").

age: Float

This parameter specifies the participant's age at which NNX is calculated. It is rounded to the nearest month.

xra: Float

This parameter specifies the deferred participant's age at which the benefit payable to the participant is started. It is rounded to the nearest month.

Algorithm

The commutation function can be calculated in two different methods: (1) Exact method; and (2) Woolhouse method. The Exact method means it is calculated without any approximation, and the Woolhouse method means it is calculated using the approximation formula.

Exact Formula

let n = xra - age, then

$$N_x^{(m)}(n) = \sum_{k=0}^{\infty} v^{o:n+k/m}{}_{}1_{x+n+k/m}$$

where *m* = 1 if *annuityType* = "AX"; *m* = 2 if *annuityType* = "SX"; *m* = 4 if *annuityType* = "QX"; *m* = 12 if *annuityType* = "MX".

Woolhouse Formula

let n = xra - age, then

$$N_x^{(m)}(n) = \sum_{k=0}^{\infty} v^{o:n+k}{}_{}1_{x+n+k} - v^{o:n}{}_{}1_{x+n}\,(m-1)/(2m)$$

where *m* = 2 if *annuityType* = "SP"; *m* = 4 if *annuityType* = "QP"; *m* = 12 if *annuityType* = "MP".

Example

09/29/2014

${}_{9.5}|\ddot{a}_{55.25}^{(12)}$ = =NNX("MX", "GM83", A1, "M", 55.25, 64.75) / =LX("GM83", "M", 55.25)

NNXY

02/26/2016

NNXY performs the calculation of $N_{xv}^{(m)}$ using PBGC's current interest rate structure. The value of N_{xv} is not rounded.

Format

02/26/2016

NNXY(*AnnType, SMMortName,SFMortName, ObjBRD, sex, age, sage, xra*)

Input

02/26/2016

SAnnType

SMMortName

SFMortName

ObjBRD

sex: String – 2 characters

This parameter specifies the gender of the primary and contingent annuitants with the first character for the primary annuitant and the second character for the contingent annuitant. The valid values are 'M', 'F', 'MF', 'FM', 'MM', and 'FF'. If 'M' or 'F' are entered, the assumption is that the contingent annuitant is of the opposite gender from the primary annuitant.

age: Float

This parameter specifies the participant's age at which NNXY is calculated. It is rounded to the nearest month.

sage: Float

This parameter specifies beneficiary's age at which NNXY is calculated. It is rounded to the nearest month.

xra: Float

This parameter specifies the deferred participant's age at which the benefit payable to the participant is started. It is rounded to the nearest month.

Algorithm

The commutation function can be calculated in two different methods: (1) Exact method; and (2) Woolhouse method. The Exact method means it is calculated without any approximation, and the Woolhouse method means it is calculated using the approximation formula.

Exact Formula

let n = *xra* - *age*, then

$$N_{xy}^{(m)}(n) = \sum_{k=0}^{\infty} v^{o:n+k/m}\, {}_{x+n+k/m}1\, {}_{y+n+k/m}1$$

where *m* = 1 if *annuityType* = "AX"; *m* = 2 if *annuityType* = "SX"; *m* = 4 if *annuityType* = "QX"; *m* = 12 if *annuityType* = "MX".

Woolhouse Formula

let n = *xra* - *age*, then

$$N_{xy}^{(m)}(n) = \sum_{k=0}^{\infty} v^{o:n+k/m}\, {}_{x+n+k/m}1\, {}_{y+n+k/m}1 - v^{o:n}\, {}_{x+n}1\, {}_{y+n}1\,(m-1)/(2m)$$

where *m* = 2 if *annuityType* = "SP"; *m* = 4 if *annuityType* = "QP"; *m* = 12 if *annuityType* = "MP".

Example

09/29/2014

${}_{9.5|}\ddot{a}_{55.25:51.25}^{(12)}$ == NNXY("MX", "GM83", "GM83M6", A1:B3, "M", 55.25, 51.25, 64.75) /(=LX("GM83", "M", 55.25) × =LY("GM83M6","F", 51.25))

KONE

02/26/2016

KONE factor levelizes free survivor spouse benefit after age A, where A is the age at which the free survivor spouse benefit drops due to widow's Social Security benefit.

Format

02/26/2016

KONE(*SAnnType, age, sage, eligibilityAge*)

Input
08/13/2015

SAnnType

age: Float

This parameter specifies the participant's age at which KONE is calculated. It is rounded to the nearest month.

sage: Float

This parameter specifies beneficiary's age at which KONE is calculated.It is rounded to the nearest month.

eligibilityAge: Integer

This parameter specifies the maximum age of participant for which survivor's benefit is payable.

Algorithm
Let x = ARA, y = SARA and e = the maximum age of participant for which survivor's benefit is payable.

$$K_1=(\ddot{a}_y^{(12)}-\ddot{a}_{\overline{xy:e-x|}}^{(12)}-{}_{e-x}p_x\cdot{}_{e-x}|\ddot{a}_y^{(12)})\div(\ddot{a}_y^{(12)}-\ddot{a}_{xy}^{(12)})$$

Example
09/29/2014

=KONE("MP", 60, 56, 65)

KTWO
02/26/2016

KTWO factor levelizes: (1) excess of free survivor spouse benefit before age A over benefit after age A; or (2) free survivor spouse benefit before age A, where A is the age at which the free survivor spouse benefit drops due to widow's Social Security benefit.

Format
02/26/2016

KTWO(*SAnnType, age, sage, eligibilityAge, dropAge*)

Input
09/29/2014

SAnnType

The present value factor can be calculated in two different methods:

1. Exact method; and
2. Woolhouse method.

The Exact method means it is calculated without any approximation, and the Woolhouse method means it is calculated using the approximation formula. The "Exact" and "Woolhouse" formulas are described in the section Algorithm.

age: Float

This parameter specifies the participant's age at which KTWO is calculated. It is rounded to the nearest month.

sage: Float

This parameter specifies beneficiary's age at which KTWO is calculated. It is rounded to the nearest month.

eligibilityAge: Integer

This parameter specifies the maximum age of participant for which survivor's benefit is payable.

dropAge: Integer

This parameter specifies the age at which free survivor spouse benefit drops.

Algorithm

Let x = ARA, y = SARA, e = the maximum age of participant for which survivor's benefit is payable, and w = age at which free survivor spouse benefit drops.

w - y <= e - x or e = 0:

$$K_2 = \left(\ddot{a}^{(12)}_{y:\overline{w-y}|} - \ddot{a}^{(12)}_{xy:\overline{w-y}|}\right) \div \left(\ddot{a}^{(12)}_{y} - \ddot{a}^{(12)}_{xy}\right)$$

w - y = e - x:

$$K_2 = \left(\ddot{a}^{(12)}_{y:\overline{w-y}|} - \ddot{a}^{(12)}_{xy:\overline{e-x}|} - {}_{e-x}p_{x} \cdot {}_{e-x}|\ddot{a}^{(12)}_{y:\overline{w-y-e+x}|}\right) \div \left(\ddot{a}^{(12)}_{y} - \ddot{a}^{(12)}_{xy}\right)$$

Example

09/29/2014

=KTWO("MP", 60, 56, 65.60)

Social Security Functions

Covered Compensation Function

COVCOMP

02/26/2016

COVCOMP = Social Security covered compensation for specified year.

Format

COVCOMP(*DOB, PlanYear, CalcInd, Method, RoundBy, MinPlanYear*)

Return

The COVCOMP function returns the Social Security covered compensation for date of birth and plan year specified. The covered compensation is the average of the wage base values for the 35-year period that ends with the year in which the Social Security retirement age occurs. The wage base for the plan year specified is used for any year in the 35-year period that is after the plan year specified, e.g. if the covered compensation is being calculated for the 2015 plan year and the Social Security normal retirement age occurs in 2020, the 2015 wage base is used for years 2015 to 2020 when determining the 35-year average. The function can calculate or lookup covered compensation values from published tables for plans on or after 1989. For plan years prior to 1989, the only option available is to lookup the covered compensation values from published tables.

Example

=COVCOMP(DATE(1960,08,01),2015,0,0,12) **returns 98,580**

Parameters

DOB is the Participant's date of birth.

PlanYear – enter the year for the date of determination for the covered compensation.

Note The function does not include logic for determining the year for the date of determination. Keep in mind that the date of determination could be the date of termination of employment, the benefit freeze date, the bankruptcy petition date, DOPT, etc. Generally the input for this parameter would be the calendar year in which the plan year begins that contains the date of determination.

CalcInd:

0 Lookup from covered compensation tables in the ATPBGC database (these are the IRS covered compensation tables shown in the PBGC Actuarial Technical Manual).

Note The earliest table in our database is for 1974 and the latest table is currently for 2015.

1 Calculate using the applicable average wage base values.

Note We were not able to obtain clear documentation on the method for calculating the covered compensation values for years prior to 1989. Therefore, a value of 1 can only be entered if the PlanYear parameter is populated with a year after 1988.

Method:

0 Regular: the 35-year period used for the calculation ends with the year in which the Social Security normal retirement age occurs.

1 Transitional: the 35-year period used for the calculation ends one year prior to the year in which the Social Security normal retirement age occurs. The transitional method only applies to the plan years from 1989 to 1994. Therefore the PlanYear parameter must be populated with a value from 1989 to 1994 when the Method parameter is populated with the value of 1.

RoundBy: enter an integer value of 1, 12, 600, or 3,000 (see valid values below).

RoundBy can be populated with a 1 only when *CalcInd* is populated with a 1. The function will return an unrounded 35-year average.

Note This is different than the values in the unrounded tables which are 35-year averages rounded to the nearest multiple of 12.

To obtain the value from the unrounded table, populate *RoundBy* with 12.

If *PlanYear* is populated with a value less than 1989, *RoundBy* can be populated with 1, 12, or 600.

If *PlanYear* is populated with a value greater than or equal to 1989 and less than or equal to 1993, *RoundBy* can be populated with 1, 12, 600, or 3,000.

If *PlanYear* is populated a value greater than or equal to 1994, *RoundBy* can be populated with 1, 12 or 3,000.

MinPlanYear (optional parameter): enter a maximum year to be used in the calculation. Plans can use any plan year up to five years before the plan year of the determination (but no earlier than the plan year that commences in 1989) as long as this is used for all participants. The value in this parameter must meet the following criteria:

Must be greater than or equal to 1989;

Less than or equal to the value in the *PlanYear* parameter;

Greater than or equal to the value in the *PlanYear* parameter minus five.

Errors

DOB Year is after *PlanYear* or *MinPlanYear*

DOB Year is not in published table for plan year specified

MinPlanYear is less than 1989

MinPlanYear is less than *PlanYear* minus 5

MinPlanYear is greater than or equal to *PlanYear*

CalcInd is 0 and there is not a record for the published table specified in the ATPBGC database

CalcInd is 1 and *PlanYear* is before 1989

PlanYear is greater than the year in the last wage base record in the ATPBGC database

CalcInd is not 0 or 1

Method is not 0 or 1

Method is 1 and *PlanYear* is not 1989, 1990, 1991, 1992, 1993, or 1994

RoundBy is populated with an invalid value for the plan year specified

RoundBy is populated with 1 when *CalcInd* is 0

PIA Functions

Social Security Offset Functions (AtPBGCex)

12/28/2020

Note These functions have been deprecated and are only retained for backward compatibility with old cases. The functionality of these functions has been replaced with the SSACALC function.

AME = Average Monthly Earnings or Indexed Average Monthly Earnings.

PIASSNRA = Social Security Benefit Payable at Social Security Administration Normal Retirement Age.

BAPPVRA = Social Security Benefit Payable by Social Security Administration at Plan Specified Age.

Format

08/13/2015

AME(*$Salary, SalYrInd, DoB, DoH, DoTE, DoD, DoBF, VRAYrs, VRAMos, IOASDI, Psex, DoPT, IFutE, IPastE, WhichSSO, PastPct, Iact, VRAorAA, AnnAct*)

PIASSNRA(*$Salary, SalYrInd, DoB, DoH, DoTE, DoD, DoBF, VRAYrs, VRAMos, IOASDI, Psex, DoPT, IFutE, IPastE, WhichSSO, PastPct, Iact, VRAorAA, AnnAct*)

BAPPVRA(*$Salary, SalYrInd, DoB, DoH, DoTE, DoD, DoBF, VRAYrs, VRAMos, IOASDI, Psex, DoPT, IFutE, IPastE, WhichSSO, PastPct, Iact, VRAorAA, AnnAct*)

Examples

@AME(SALARIES, 1986, @DATE(53,4,30), @DATE(83,4,12), @DATE(88,7,1), 0, @DATE(87,8,31), 65, 0, "A", "F", @DATE(91,12,16), "A", "A"< "A", 0, "A", "A", "A") **Returns 2285**

@PIASSNRA($SALARIES, 1986, @DATE(53,4,30), @DATE(83,4,12), @DATE(88,7,1), 0, @DATE(87,8,31), 65, 0, "A", "F",@DATE(91,12,16), "A", "A", "A", 0, "A", "A", "A") **Returns 839.9**

@BAPPVRA($SALARIES, 1986, @DATE(53,4,30), @DATE(83,4,12), @DATE(88,7,1), 0, @DATE(87,8,31), 65, 0, "A", "F",@DATE(91,12,16), "A", "A", "A", 0, "A", "A", "A") **Returns 738**

Parameters

Parameter Name	Definition
$Salary	Is a one-sheet one-row range of consecutive year salaries. An error results if *$Salary* has more than 1 row, more than 200 columns, or no positive data. The most recent information should be in the leftmost column. Note that leading or trailing blanks or $0.00s within the *$Salary* range produce inconsistent results and should not be used.
SalYrInd	Is 4-digit year for the salary in the first cell in SALARY. An error results if *SalYrInd* > year of *DOPT* or *SalYrInd* < 1936.
DOB	Is Date of Birth. An error results if *DOB* > *DOD*.
DOH	Is Date of Hire. An error results if *DOH* > *DOTE* or if *DOH* > *DOBF*.
DOTE	Is Date of Termination of Employment (could be date of disability on set). An error results if *DOTE* < 1951, *DOTE* < *DOH*, or *DOTE* > *DOPT*.
DOD	Is Date of Death. An error results if *DOD* < *DOB*. (Not relevant, as Widow(er) calculations are not currently a valid option).
DOBE	Is the Date of Benefit Freeze. If the plan froze benefits before a participant's *DOTE*, then the offset must be calculated using the Social Security Act in Effect at DOBF

	instead of at *DOTE*. Values of *DOBF* which are either zero or not before *DOTE* are ignored. An error results if *DOBF* < *DOH*.
VRAYrs	(Valuation retirement age years and months) indicate an age in years and months: • If *WhichSSO* = "A": Age at which the offset is to be calculated. • If *WhichSSO* = "P": Future earnings are assumed to remain constant through calendar year preceding calendar year in which Age (in *VRAYrs* and *VRAMos*) is reached, and to be $0.00 thereafter.
VRAMos	(Valuation retirement age years and months) indicate an age in years and months: • If *WhichSSO* = "A": Age at which the offset is to be calculated. • If *WhichSSO* = "P": Future earnings are assumed to remain constant through calendar year preceding calendar year in which Age (in *VRAYrs* and *VRAMos*) is reached, and to be $0.00 thereafter.
IOASDI	Indicates the type of social security benefit to be estimated. • A: Old age • B: Widow(er) (Not currently a valid option) • C: Disability (Not currently a valid option)
PSex	Is Participant Sex
DOPT	Is Date of Plan Termination. An error results if *DOPT* < 04/01/1972 or *DOPT* < *DOTE*.
IFutE	Is the Future Earnings Indicator. This determines which assumptions will be used for wages earned during and after the calendar year of *DOTE*. • A: Use the annualized earnings during the year of termination of employment as the assumed wages earned each year thereafter and before the calendar year in which a plan-specified age is reached (see *VRAYrs* and *VRAMos*). • B: Use the annualized earnings during the year of termination of employment as the assumed wages earned each year thereafter and before the calendar year in which the participant's Social Security normal retirement age is reached. An error results if *IFutE*=B when *WhichSSO*=A. • C: Use $0.00 as the assumed wages earned each year after the year of termination of employment. • D: Use the earnings during the calendar year before *DOTE* as the assumed wages thereafter and before the calendar year in which a plan-specified age is reached (see *VRAYrs* and *VRAMos*). • E: Use the earnings during the calendar year before *DOTE* as the assumed wages thereafter and before the calendar year in which the participant's Social Security normal retirement age is reached. An error results if *IFutE*=E when *WhichSSO*=A.
IPastE	Is the Past Earnings Indicator. This determines which assumptions will be used for wages earned before the first year for which wages are provided in the $Salary region. • A: Use all wages starting from 1951 or the calendar year participant attains age 21, whichever is later. Wages before the first year of actual salary input data will be estimated using ASD's standard salary. • B: Use all wages starting from 1951 or the calendar year participant attains age 21, whichever is later. Wages earned before the first year of actual salary input data will be assumed to equal the first input salary. • C: Use all wages starting from 1951 or the calendar year participant attains age 21, whichever is later. Wages earned before the first year of actual salary input

	data will be estimated based on an assumed fixed percentage (see *PastPct*) increase in each of the preceding years. • D: Use all wages starting from 01/01/1951 or the calendar year of the participant's date of hire, whichever is later. Wages before the first year of actual salary input date will be estimated using ASD's standard salary estimation method. • E: Use all wages starting from 01/01/1951 or the calendar year of the participant's date of hire, whichever is later. Wages earned before the first year of actual salary input data will be assumed to equal the first input salary. • F: Use all wages starting from 01/01/1951 or the calendar year of the participant's date of hire, whichever is later. Wages earned before the first year of actual salary input data will be estimated based on an assumed fixed percentage increase (see *PastPct*) in each of the preceding years.
WhichSSO	Indicates the type of offset to be generated. • A: Calculate the actual Social Security benefit payable at a plan-specified age (see VRAYrs and VRAMos). An error results if WhichSSO=A when IFutE is "B" or "E". • P: Calculate the primary insurance amount payable at Social Security normal retirement age.
PastPct	Is the assumed Past Earnings Percentage when *IPastE* equals "C" or "F". 0=< *PastPct* =< 0.50.
IAct	Indicates the Social Security Act to be used for the calculation. The default value is "A". • A: Use the act in effect at *DOTE* Act • B: Use the 1952 Act • C: Use the 1954 Act • D: Use the 1958 Act • E: Use the 1965 Act • F: Use the 1967 Act • G: Use the 1969 Act • H: Use the 1971 Act • I: Use the 1954 Act • J: Use the 1973 Act • K: Use the 1977 Act • L: Use the 1983 Act
VRAorAA	(Valuation retirement age of attained age) applies to participants whose attained age at *DOTE* exceeds the plan-specified "valuation retirement age". • A: Assume the participant terminated employment immediately upon reaching the plan-specified valuation retirement age (VRA). Any actual wages earned after the plan-specified VRA are ignored. • B: If *WhichSSO* = "A", use the attained age as of *DOTE* (or *DOBF*) as the valuation age at which to calculate the offset. If *WhichSSO* = "P", use the attained age as of *DOTE* (or *DOBF*) as the age at which constant future earnings stop. If that attained age is on or after the Social Security normal retirement age, then there are no future earnings.
AnnAct	(Annual or actual) is the Last Year Salary Indicator. If one of the input salaries is for the year of *DOTE*, then @PIASSNRA needs to know whether the salary is an annualized or a partial year's salary.

	• A: The salary figure for the calendar year of *DOTE* is the actual salary earned up until *DOTE* and therefore represents a non-annualized partial year's salary. • B: The salary figure for the calendar year of *DOTE* has been annualized or was submitted as annual salary.

SSA Functions

General Information about SSA Functions

12/28/2020

The SSA functions were developed using the source code for the ANYPIA32 program developed by the Social Security Administration. The ANYPIA32 program provided by the Social Security Administration can be run as a stand-alone program for an individual calculation or can be run in a batch mode for processing multiple calculations (e.g., plan administrator running PIA estimates for a group of participants). The ANYPIA32 program was developed and is maintained using C++. The Social Security Administration allows developers to download and use the source code for the ANYPIA32 program. TRMD acquired the source code and compiled it is as the third library called SSAaddin.dll for inclusion as part of the ATPBGC Add-In package (the other two libraries included in the ATPBGC Add-In are ATPBGC.dll and PIA32.dll). TRMD has also modified the ATPBGC2007.xlam (the Add-In loaded to Excel) to include three new functions (*SSACalc* and *SSASample* - added in the ATPBGC Add-In 6.6 and SSAVAL - added in the ATPBGC Add-In 6.9) that call the SSAaddin.dll library and are used to perform Social Security calculations in Excel. The SSA functions *SSACalc* and *SSASample* were first added as a BETA version in the ATPBGC Add-In 6.6 as part of the BCV Legacy 1.6 release in February 2016. The SSA function *SSACalc* was updated in the ATPBGC Add-In 6.7 as part of the BCV Legacy 1.7 release (second phase) in August 2016 and with that update was available for production use in calculating plan benefits that are integrated with Social Security benefits. The *SSACalc* function was again updated in the ATPBGC Add-In 6.8 as part of the BCV Legacy 1.8 release in March 2017 and with that update the data values that are published by SSA annually (e.g., national average wage, COLA's, covered earnings, etc.) that are not contained in the current SSAaddin.dll can be read from the ATPBGC database until the next deployment of the ATPBGC Add-In (i.e., the default computation year is no longer limited to the computation year supported by the data contained in the SSAaddin.dll as was the case in the initial release of the *SSACalc* function for production use). The *SSACalc* function was again updated in ATPBGC Add-In 6.9 as part of the BCV Legacy 1.9 release in October 2017 and with that update, users now have all the same options that were included with the older PIA functions and can calculate a survivor benefit for a parent of the worker's dependent children or for the dependent worker's children. The SSAVAL function was added for the first time in the ATPBGC Add-In 6.9. The *SSACalc* function was again updated in ATPBGC Add-In 6.10 as part of the BCV Legacy 1.10 release in February 2018 and with that update, users now can obtain the earliest and full retirement date for the worker, spouse, or former spouse. The *SSACalc* function may be enhanced further or new SSA functions may be developed in later releases of the ATPBGC Add-In to be able to handle some additional calculations not currently supported (e.g., calculation of a survivor benefit if the worker dies after commencing his/her benefit, calculation of a disability benefit, etc.). Future revisions to the existing functions are expected to be backward compatible.

Note The SSA functions include a parameter for entering the computation year. This is a critical entry when the calculation has to be made as of a particular date (e.g., DOPT, benefit freeze date, PC3 Date, etc.). The last set of data values in the SSAaddin.dll is for 2018 but the latest computation year supported is based on the last set of data values in the SSA_VAL table in the ATPBGC database. TRMD updates the SSA_VAL table in the ATPBGC database as soon as the data values are published by SSA (generally published at the beginning of each year). TRMD plans to deploy in each maintenance release an updated SSAaddin.dll that has been compiled from the latest version of the code from SSA. SSA publishes two versions of the ANYPIA32 program each year YYYY.1 and YYYY.2. The first version is published at the beginning of the year following the publication of the annual data values (COLA, national average wage, and old and new law wage base values), and the second version is published in the second half of the year following the publication of the SSA trustees' annual report. The current SSAaddin.dll has been compiled from the 2020.1 version of the code from SSA.

Note The Social Security Administration's detailed calculator program and documentation can be downloaded using the following link: https://www.ssa.gov/OACT/anypia/anypia.html

Social Security Administration Functions

09/28/2017

SSACALC: This function returns the calculated result specified (e.g. high PIA, full retirement age, early retirement age, etc.) based on the inputs provided in the parameters of the function.

SSASAMPLE: This function returns the calculated result specified (e.g. high PIA, full retirement age, early retirement age, etc.) based on the inputs provided via the specified input file (the input file has the same format as the input file that can be read by the Social Security Administration's ANYPIA32 stand-alone program. This function is mainly provided to help with determining how to populate parameters in the SSACALC function and to help with verification that results in Excel match those in the ANYPIA32 program.

SSAVAL: This function can be used to obtain values from the SSA_VAL table in the ATPBGC database or from the SSAaddin.dll library (C++ library used by the SSACALC function).

SSACALC

03/29/2018

Format

SSACALC(*Rslt, Sex, DOB, DOD, BenTp, Ntldt, BenDt, FstSlPrjYr, LstSlPrjYr, BckPrjTp, Bckprjpct, FstSlYr, FwdPrjTp, FwdPrjPct, LstSlYr, SlTp, Sl, Compyr, Biasm, BiPct, Awiasm, AwiPct, Bic, BDOB, Bntldt, Bic2, BDOB2, Benttldt2, Pre78Qtrs, Calcdsc, Wbasm, Wbnew, Wbold, Lstsldt, Fstsldt, ErnBckPct*)

All parameters following the *Compyr* parameter are optional.

Return

Based on entry in the *Rslt* parameter. The user can specify any of the following results:

Worker's Primary Insurance Amount—monthly Social Security benefit at full retirement date Maximum Family Benefit—maximum family benefit at full retirement date

Worker's Monthly Old Age Benefit Unrounded—unrounded monthly benefit at specified retirement date Worker's Monthly Old Age Benefit Rounded—rounded monthly benefit at specified retirement date Worker's Early Retirement Age Years—earliest retirement years age

Worker's Early Retirement Age Months—earliest retirement months age Worker's Full Retirement Age Years—full retirement years age

Worker's Full Retirement Age Months—full retirement months age

Worker's Earliest Retirement Date – earliest retirement date

Worker's Full Retirement Date – full retirement date

Worker's Average Indexed Monthly Earnings—averaged indexed monthly earnings

Worker's Early Retirement Factor—early retirement factor for old age benefit at specified retirement date

Worker's Late Retirement Factor—late retirement factor for old age benefit at specified retirement date

Beneficiary/Survivor Benefit for Current Spouse—beneficiary benefit (paid while worker is living) when old age benefit calculation specified and survivor benefit when survivor benefit calculation specified

Beneficiary/Survivor Benefit for Former Spouse—beneficiary benefit (paid while worker is living) when old age benefit calculation specified and survivor benefit when survivor benefit calculation specified

Current Spouse's Early Retirement Age Years—earliest retirement years age Current Spouse's Early Retirement Age Months—earliest retirement months age Current Spouse's Full Retirement Age Years—full retirement years age

Current Spouse's Full Retirement Age Months—full retirement months age Current Spouse's Earliest Retirement Date – earliest retirement date Current Spouse's Full Retirement Date – full retirement date

Former Spouse's Early Retirement Age Years—earliest retirement years age Former Spouse's Early Retirement Age Months—earliest retirement months age Former Spouse's Full Retirement Age Years—full retirement years age

Former Spouse's Full Retirement Age Months—full retirement months age Former Spouse's Earliest Retirement Date – earliest retirement date Former Spouse's Full Retirement Date – full retirement date

Beneficiary/Survivor Early Retirement Factor for Current Spouse—early retirement factor for beneficiary benefit (paid while worker is living) when old age benefit calculation specified and early retirement factor for survivor benefit when survivor benefit calculation specified

Beneficiary/Survivor Early Retirement Factor for Former Spouse—early retirement factor for beneficiary benefit (paid while worker is living) when old age benefit calculation specified and early retirement factor for survivor benefit when survivor benefit calculation specified

Filename.pia—create an input text file that can be fed into the Social Security Administration's ANYPIA32 program (see *Rslt* parameter for details)

Example

=SSACALC("highPIA", "M", 12/13/1966, 0, 1, 12/01/2031, 0, 2003, 2031, 0, 0, 2003, 2, 0, 2016, SALARY_TYPE, SALARY, 2016, 0, BEN_INC_PCT, 0, AWI_PCT, "", 0, 0, "", 0, 0, PRE_78_QTRS, "Sample",0)
returns $2,547.80

SALARY_TYPE is a one cell range containing 2016 which is the last year in the range specified for the salaries SALARY is a one row range with earnings from 2003 to 2016:

$100,000.00, $125,000.00, $150,000.00, $175,000.00, $200,000.00, $225,000.00, $250,000.00, $275,000.00, $300,000.00, $325,000.00, $350,000.00, $375,000.00, $400,000.00, $425,000.00

BEN_IN_PCT is a one cell range containing 0

AWI_PCT is a one cell range containing 0 PRE_78_QTRS is a one cell range containing 0

Note A range must be specified in the parameters Sl, BiPct, AwiPct, and Pre78Qtrs because these parameters will all accept a single cell or multiple cell range. A value cannot be entered directly into these parameters, e.g., you cannot populate the Sl parameter with $30,000 but instead must provide a single cell range containing the value $30,000.

Parameters

Rslt: this is a string parameter for specifying the result desired (capitalization does not matter). The valid values are:

highPIA - worker's monthly Social Security benefit at full retirement date

highMfb - maximum family benefit at full retirement date

unroundedBenefit - worker's unrounded monthly benefit at specified retirement date

roundedBenefit - worker's rounded monthly benefit at specified retirement date

earlyRetAge-years - worker's earliest retirement years age

earlyRetAge-months - worker's earliest retirement months age

fullRetAge-years - worker's full retirement years age

fullRetAge-months - worker's full retirement months age

earlyRetDate – worker's earliest retirement date

fullRetDate – worker's full retirement date

avgindmoearn – worker's averaged indexed monthly earnings

erf - early retirement factor for old age benefit at specified retirement date

lrf - late retirement factor for old age benefit at specified retirement date

spousebenefit - beneficiary benefit (paid while worker is living) when old age benefit calculation specified and survivor benefit when survivor benefit calculation specified for current spouse

benfbenefit - beneficiary benefit (paid while worker is living) when old age benefit calculation specified and survivor benefit when survivor benefit calculation specified for former spouse

spouseearlyRetAge-years – current spouse's earliest retirement years age

spouseearlyRetAge-months - current spouse's earliest retirement months age

spousefullRetAge-years - current spouse's full retirement years age

spousefullRetAge-months - current spouse's full retirement months age

spouseearlyRetDate – current spouse's earliest retirement date

spousefullRetDate – current spouse's full retirement date

benfearlyRetAge-years – former spouse's earliest retirement years age

benfearlyRetAge-months - former spouse's earliest retirement months age

benffullRetAge-years - former spouse's full retirement years age

benffullRetAge-months - former spouse's full retirement months age

benfearlyRetDate – former spouse's earliest retirement date

benffullRetDate – former spouse's full retirement date

spouseerf - early retirement factor for beneficiary benefit (paid while worker is living) when old age benefit calculation specified and early retirement factor for survivor benefit when survivor benefit calculation specified for current spouse

benferf - early retirement factor for beneficiary benefit (paid while worker is living) when old age benefit calculation specified and early retirement factor for survivor benefit when survivor benefit calculation specified for former spouse

filename.pia - create an input text file that can be fed into the Social Security Administration's ANYPIA32 program. The filename just needs to conform to normal Window's file naming rules but should use an extension of .pia which is recognized by the ANYPIA32 program as an input file. In Excel the function will return either "File already exists" or "File successfully written". The file created will be in the same folder as the spreadsheet. Two special characters can be used as a prefix on the file name:

! – Overwrite the existing file

+ - Append to the existing file

If no prefix is included, the file will be written if it does not already exist; an existing file will not be overwritten.

Sex: this is a one-character string parameter for specifying gender. The valid values are:

M – Male

F – Female

DOB: this is a date parameter for specifying the date of birth.

DOD: this is a date parameter for specifying the worker's date of death (must be populated when a survivor benefit is specified (2 is entered in *BenTp* parameter). The worker's date of death must be before the commencement date for the survivor benefit (date entered in *Bntldt* or in Benttldt2 parameters). Populate with 0 for an old age benefit calculation (1 is entered *BenTp* parameter).

BenTp: this is a numeric parameter for specifying the benefit type code. The valid values are:

1 – Old Age Benefit

2 – Survivor Benefit

3 – Disability Benefit (not currently implemented but planned for future)

Ntldt: The commencement date for either the old age benefit or disability benefit (not currently implemented). This parameter must be populated with a valid value when an old age benefit calculation (1 is entered in the *BenTp* parameter) is specified.

Note For the old age benefit, the earliest commencement date is the month following the month in which the worker attains age 62 unless the worker's date of birth is on the first or second day of the month in which case the earliest commencement date is the month in which the worker attains age 62.

Note Only the month and year of the date entered are used in the calculation so the day of the date entered is not important.

Note When a survivor benefit calculation is specified (2 is entered in the BenTp parameter), this parameter must currently be set to 0. If the worker was receiving an adjusted benefit prior to his/her death, the survivor benefit can be affected. An enhancement planned for a future release is to allow an entry in this parameter for the worker's benefit commencement date if he/she had commenced an old age benefit before his/her death and a survivor benefit calculation is specified (2 is entered in the BenTp parameter).

BenDt: For the old age benefit or disability benefit (not currently implemented) calculation, this is the date on or after the date entered in the *Ntldt* parameter (i.e., a date on or after the original commencement date) at which the benefit is determined. Enter a date in this parameter for the scenario where the participant starts receiving a benefit at the date entered in the *Ntldt* parameter, and you want to know the amount of the benefit at a later date (i.e., at the date entered in the *BenDt* parameter). Do not enter a date in this parameter that is later than the date entered in the *Ntldt* parameter if you want the benefit payable at the original commencement date (date entered in the *Ntldt* parameter). The actuarial reduction or delayed retirement credit will be calculated as of the date entered in the *Ntldt* parameter. For example, if someone is retiring at age 62 in March 1999, and you want to estimate the benefit as of March 1999, enter a date of March 1999 in the *Ntldt* parameter and either leave the *BenDt* parameter blank or populate it with the same date entered in the *Ntldt* parameter. If you want to know what the benefit will be in March 2002 (at age 65), after benefits have been received for 3 years, leave a date of March 1999 as the date entered in the *Ntldt* parameter and enter a date of March 2002 in the *BenDt* parameter. In either case, the benefit estimate will reflect 3 years of reduction. If you want to know what the benefit would be if retirement were delayed until March 2002, enter a date of March 2002 in the *Ntldt* parameter and either leave the *BenDt* parameter

blank or populate it with the same date entered in the *Ntldt* parameter. In that case, the benefit estimate will not reflect any reduction for age (assuming a full retirement age of 65).

This parameter must be populated for the survivor benefit calculation with a date that is on or after the date entered in the *Bntldt* or *Benttldt2* parameters. The relationship between *Bntldt*/*Benttldt2* and *BenDt* for the survivor benefit calculation is the same as the relationship between *Ntldt* and *BenDt* for the old age and disability benefit calculation with the exception that the *BenDt* must be populated for the survivor benefit calculation even if the survivor benefit is being computed as of the original benefit commencement date, i.e., in that scenario the same date is entered in the *Bntldt* or *Benttldt2* parameters and the *BenDt* parameter (for the old age and disability benefit calculation, the *BenDt* parameter can be left blank when the benefit is being computed as of the original commencement date).

FstSlPrjYr: first year of earnings to be used in calculation (enter as 4-digit year). The year entered has to be greater than or equal to the year of the worker's date of birth (date entered in DOB parameter). The year entered also has to be less than or equal to the year entered in the *FstSlYr* parameter.

LstSlPrjYr: last year of earnings to be used in calculation (enter as 4-digit year). The year entered has to be greater than or equal to the earlier of the year entered in the *LstSlYr* parameter and the year entered in the *Compyr* parameter.

Note The year entered in the LstSlYr parameter is limited automatically to the year entered in the Compyr parameter (i.e., the function will automatically change the year entered in the LstSlYr parameter so that it is the same as the year entered in the Compyr parameter when the original year entered in the LstSlYr parameter is greater than the year entered in the Compyr parameter). However, this is not the case with the year entered in the LstSlPrjYr parameter so if there is a need to limit the year entered in the LstSlPrjYr parameter to the year entered in the Compyr parameter, this has be done before entering the year into the LstSlPrjYr parameter.

BckPrjTp: this is a numeric parameter for specifying the backward projection code. This is the projection used to estimate earnings from the first available earnings provided in the *Sl* parameter back to the first year of earnings to be used in the calculation (the year entered in the *FstSlPrjYr* parameter). The valid values are:

0 – no backward projection ($0 earnings will be used for each year prior to the year specified in the *FstSlYr* parameter back to the year specified in the *FstSlPrjYr* parameter).

1 – backward projection will be based on average wage increase.

2 – backward projection will be based on a fixed percentage (specified in the *Bckprjpct* parameter) each year (use this option with 0 entered in the *Bckprjpct* parameter to have the function use the first available earnings provided in the *Sl* parameter for all years prior to the year entered in the *FstSlYr* parameter back to the year entered in the *FstSlPrjYr* parameter).

Bckprjpct: the backward fixed percentage for each year (populate when the backward projection code of 2 is entered in the *BckPrjTp* parameter). The value must be entered as a percentage and not as a decimal value (e.g., 2.5 for 2.5%). The entry will be rounded automatically to two decimal places.

FstSlYr: the year for the first available earnings (enter as 4-digit year). The year entered has to be greater than or equal to the year of the worker's date of birth (date entered in *DOB* parameter). The year entered also has to be greater than or equal to the year entered in the *FstSlPrjYr* parameter. The year entered also has to be less than or equal to the earlier of the year entered in the *LstSlYr* parameter and the year entered in the *Compyr* parameter.

Note The entry in the LstSlYr parameter is limited automatically to the year entered in the Compyr parameter (i.e., the function will automatically change the year entered in the LstSlYr parameter so that it is the same as the year entered in the Compyr parameter when the original year entered in the LstSlYr parameter is greater than the year entered in the Compyr parameter). The limit that is applied to the year entered in the LstSlYr parameter can result in the year entered in the FstSlYr being greater than the year used for the LstSlYr parameter (after the year entered is limited to the year entered in the Compyr parameter). An error is returned by the function when the year entered in the FstSlYr is greater than the year used for the LstSlYr parameter (year after being limited to year entered in the Compyr parameter).

FwdPrjTp: this is a numeric parameter for specifying the forward projection code. This is the projection used to estimate earnings from the last available earnings provided/used in the *Sl* parameter forward to the last year of earnings to be used in the calculation (the year entered in the *LstSlPrjYr* parameter). If the year entered in the *Compyr* parameter is before the year entered in the *LstSlYr* parameter, the last year of earnings used for the calculation are the earnings for the year entered in the *Compyr* parameter. The valid values are:

> 0 – no forward projection ($0 earnings will be used for each year after the earlier of the year specified in the *LstSlYr* parameter and the year entered in the *Compyr* parameter up to the year specified in the *LstSlPrjYr* parameter).
>
> 1 – forward projection will be based on average wage increase.
>
> 2 – forward projection will be based on a fixed percentage (specified in the *FwdPrjPct* parameter) each year (use this option with 0 entered in the *FwdPrjPct* parameter to have the function use the last available earnings provided/used in the *Sl* parameter for all years after the earlier of the year entered in the *LstSlYr* parameter and year entered in the *Compyr* parameter up to the year entered in the *LstSlPrjYr* parameter).

FwdPrjPct: the forward fixed percentage for each year (populate when the forward projection code of 2 is entered in the *FwdPrjTp* parameter). The value must be entered as a percentage and not as a decimal value (e.g., 2.5 for 2.5%). The entry will be rounded automatically to two decimal places.

LstSlYr: the year for the last available earning (enter as 4-digit year). The year entered has to be less than or equal to the year entered in the *LstSlPrjYr* parameter. The year entered also has to be greater than or equal to the year entered in the *FstSlYr* parameter.

Note The year entered in the LstSlYr parameter is limited automatically to the year entered in the Compyr parameter (i.e., the function will automatically change the year entered in the LstSlYr parameter so that it is the same as the year entered in the Compyr parameter when the original year entered in the LstSlYr parameter is greater than the year entered in the Compyr parameter). The automatic limit that is

applied to the year entered in the LstSlYr parameter can result in the year entered in the FstSlYr parameter being greater than the year used for the LstSlYr parameter (after the year entered in the LstSlYr parameter is limited to the year entered in the Compyr parameter) which will cause an error to be returned by the function.

Note The last year of earnings are used for estimating missing earlier earnings even when the last year of earnings is not used in the calculation. For example, if the LstSlYr parameter is populated with 2015 and the Compyr parameter is populated with 2014, the 2014 earnings are the last earnings used in the calculation but if the 2014 earnings are missing and the 2015 earnings are available, the earnings for 2014 will be estimated from the 2015 earnings even though the 2015 earnings are not being used for the calculation.

SlTp: this is a numeric parameter for specifying the salary-type code. A 4-digit year (see below for details on how the function works when a 4-digit year is specified in the *SlTp* parameter) or a valid range must be entered into this parameter. The range entered can either contain a single cell or must contain the same number of cells included in the range entered in the *Sl* parameter. A range with a single cell can only be entered in the *SlTp* parameter when the value in that cell is a 4-digit year. Otherwise, the range must be the same size as the range specified for the *Sl* parameter and there is a one to one correspondence between the values in the cells included in the range entered in the *SlTp* parameter and the cells included in the range entered in the *Sl* parameter. The valid values for each cell in range entered in the *SlTp* parameter are:

0 – The value entered in the applicable cell specified in the range entered in the *Sl* parameter is used as the earnings for the calculation.

Note If the applicable cell in the range entered in the Sl parameter is blank or contains $0.00, $0.00 earnings are used for that year in the calculation.

1 – The value entered in the applicable cell specified in the range entered in the Sl parameter is ignored and the maximum covered earnings for the applicable year is used for the calculation.

2 – The value entered in the applicable cell specified in the range entered in the Sl parameter is ignored and the "high" earnings (160 percent of national average wage) for the applicable year is used for the calculation.

3 – The value entered in the applicable cell specified in the range entered in the Sl parameter is ignored and the "average" earnings (100 percent of national average wage) for the applicable year is used for the calculation.

4 – The value entered in the applicable cell specified in range entered in the Sl parameter is ignored and the "low" earnings (45 percent of national average wage) for the applicable year is used for the calculation.

5, Blank, or NULL – Using the standard method found in the ATM, a value is estimated for the applicable empty cell in the range entered in the Sl parameter and is used for the calculation.

Note NULL is provided as an option so that if desired a formula can be entered in each cell in the range entered in the SlTp parameter, e.g., =IF(ISBLANK(AT2),"NULL",0) where AT2 is the applicable cell in the Sl parameter.

Note The value determined for the first year in the salary range is used for determining past earnings values and the value determined for the last year in the salary range is used for determining future earning values. For example, if a value of 0 is in the last cell in the range entered in the SlTp parameter and the last cell in the range entered in the Sl parameter is blank or contains $0.00, all future earnings will be $0.00 regardless of the future earnings projection specified in the FwdPrjTp parameter.

Note The earnings of the last year from the salary range are the earnings for the earlier of the year entered in the LstSlYr parameter and the year entered in the Compyr parameter so if 2015 is entered in the LstSlYr parameter and 2014 is entered in the Compyr parameter, the earnings for 2014 are used to project all future earnings and not the earnings for 2015.

YYYY (4-digit year) – A 4-digit year can only be specified when a single cell range is entered in the *SlTp* parameter or when a 4-digit year is entered directly in the parameter. The 4-digit year indicates the year associated with the last cell in the range entered in the *Sl* parameter. For example, if the range AA13:AZ13 is entered in the *Sl* parameter and the cell specified in the range entered in the *SlTp* parameter contains the value 2015, the function knows that cell AZ13 is associated with the salary for 2015, and then if 1995 is entered in the *FstSlYr* parameter and 2000 is entered in the *LstSlYr* parameter, the function will use the values in cells AF13:AK13. Also, when a digit year is specified for the *SlTp* parameter (entered directly or in a single cell range entered in the *SlTp* parameter), the function will automatically estimate earnings using the standard method found in the ATM for any missing values in the salary range determined using the 4-digit year specified in the *SlTp* parameter along with the 4-digit year values entered in the *FstSlYr* and *LstSlYr* parameters (please see note below for the distinction between a blank cell and a cell that contains $0.00). In the example above, if cells AF13:AJ13 are populated but cell AK13 is blank, the function would estimate the 2000 earnings from the 1999 earnings found in cell AJ13. When a 4-digit year is specified, it is possible to enter for the *Sl* parameter a range of the same size for each record, thereby making it easier to set-up the V1/VE spreadsheet. The static range size would include the cells necessary to cover the earliest year of earnings up to the latest year of earnings, taking all records into consideration.

Note When a 4-digit year is entered in the SlTp parameter, the SSACALC function considers the salary data as missing for a year if the cell associated with that year is empty. For example, if the input in the Sl parameter is AA2:AE2 and the input in the SlTp parameter is 2015, the SSACALC function will consider the salary for 2014 to be missing if AD2 is empty. If AD2 is actually populated with $0.00, the SSACALC function will consider the $0.00 as the actual salary for 2014 to be used in the calculation. Therefore, if the salary is actually missing for a year, it is important that the cell for that year be left empty and not populated with $0.00; otherwise, a salary will not be estimated for that year and instead $0.00 will be used as the salary for that year.

Note Unless a 4-digit year is specified in the SlTp parameter, the size of the range entered in both the SlTp parameter and the Sl parameter must match the number of years of earnings specified by the values entered in the FstSlYr parameter and the LstSlYr parameter (e.g., if 1980 is entered in the FstSlYr parameter and 1990 is entered in the LstSlYr parameter, the range entered in both the SlTp parameter and the Sl parameter must contain 11 cells, one for each year from 1980 to 1990). When a 4-digit year is specified in the SlTp parameter, the size of the range entered in the Sl parameter does not have to match the number of years of earnings specified by the values entered in the FstSlYr parameter and the LstSlYr parameter thereby allowing the same size range to be specified for the Sl parameter for all records. The

size of the range entered in the Sl parameter can be less than, greater than, or equal to the number of years of earnings specified by the values entered in the FstSlYr parameter and the SlTp parameter. When the 4-digit year entered in the LstSlYr parameter is greater than the 4-digit year entered in the SlTp parameter, earnings are estimated for the years that follow the 4-digit year entered in the SlTp parameter, e.g., if 2016 is entered in the LstSlYr parameter and 2014 is entered in the SlTp parameter, earnings are estimated for 2015 and 2016. Similarly, when the 4-digit year entered in the FstSlYr parameter is less than the year corresponding to the first cell in the range entered in the Sl parameter, earnings are estimated for the years that precede the year corresponding to the first cell in the range entered in the Sl parameter, e.g., if 2000 is entered in the FstSlYr parameter and the 2002 is the year corresponding to the first cell in the range entered in the Sl parameter, earnings are estimated for 2000 and 2001.

Note Missing earnings can only be estimated for years from 1951 up to the latest year for which the national average wage has been published and added to the ATPBGC database. The national average wage for a particular year is published toward the end of the following calendar year, e.g., the national average wage for 2014 was published at the end of 2015. Therefore, if the function is being used to perform a calculation in the middle of 2016 (before the national average wage is published for 2015), missing earnings can only be estimated for years up to 2014. Contact TRMD if there is a need to be able to have the function estimate earnings for a year that is after the last year for which the national average wage has been published, as an estimated national average wage value can be added to the ATPBGC database for use by the function until a final value is published (TRMD will replace estimated national average wage values added to the ATPBGC database with the final published values at which point the function may return a different result than the result obtained before the update).

Sl: this is a parameter for entering a single row range that contains one cell for each year of earnings. The earning data must be entered from the earliest year to the latest year from left to right. For example, if the earnings data available is for 2000 to 2004 and the range entered is AA2:AE2, the 2000 earnings must be in cell AA2, the 2001 earnings must be in cell AB2, the 2002 earnings must be in cell AC2, the 2003 earnings must be in cell AD2, and the 2004 earnings must be in cell AE2. When a 4-digit year is specified in the *SlTp* parameter, the range entered in the *Sl* parameter can be a fixed size for all records that is big enough to cover all years for which earnings data is available across the entire population. The 4-digit year specified in *SlTp* parameter indicates the year associated with the last cell in the range entered in the *Sl* parameter. When a 4-digit year is not specified in the *SlTp* parameter, the size of the range entered in the *Sl* parameter must match the number of years specified by the values entered into the *FstSlYr* and *LstSlYr* parameters (e.g., if 1980 is entered in the *FstSlYr* parameter and 1990 is entered in the *LstSlYr* parameter, the range entered in the *Sl* parameter must contain 11 cells, one for each year from 1980 to 1990). When a 4-digit year is specified in the *SlTp* parameter, the size of the range entered in the *Sl* parameter can be less than, greater than, or equal to the number of years of earnings specified by the values entered in the *FstSlYr* parameter and the *SlTp* parameter. With the 4-digit year option the same size range can be specified for the *Sl* parameter for all records. Please see the notes at the end of the *SlTp* parameter guidance above for additional information about the relationship between the *SlTp* parameter and the *Sl* parameter.

Note If 0 is entered in a cell specified in the range entered in the SlTp parameter and the associated cell specified in the range entered in the Sl parameter is blank, the function will use an earnings amount of $0 for the year corresponding to that associated cell in the calculation, i.e., the function does not

determine an estimated salary for the year corresponding to the blank cell. Therefore, if earnings are missing for certain years and 0 is entered in the corresponding cell in the range entered in the SlTp parameter, it is necessary for the user to estimate the earnings for those years and provide those estimated amounts along with the known earnings in the range entered in the Sl parameter. Blank cells in the range entered in the Sl parameter are not an issue if the corresponding cell in the range entered in the SlTp parameter is set to a value other than 0 because either the value in the cell specified in the range entered in the Sl parameter is ignored (entry in the SlTp parameter is 1, 2, 3, or 4) or estimated salaries are determined by the function for missing earnings in the cell specified in the range entered in the SlTp parameter (entry in the corresponding cell in the range entered in the SlTp parameter is 5, blank, NULL, or a 4-digit year has been specified for the SlTp parameter). Please see the note in the guidance for the SlTp parameter with respect to how the function treats a cell in the salary range that is populated with $0.00 versus a cell that is empty, i.e., it is important that cells corresponding to years in which earnings are missing are left blank and not populated with $0.00.

CompYr: the computation year (enter as a 4-digit year). The year entered in this parameter controls which actual data values (annual COLA, annual wage base for old and new law, annual national average wage, and worker's annual earnings) are used in the calculation. For example, if the year entered is 2016, the functions use the annual COLA values though 12/31/2015, the annual wage base values through 2016, the national average wage values through 2014 and the worker's annual earnings through 2016 (depending on the value entered in the *FwdPrjTp*, projected earnings are used for years after 2016). The year entered must be on or after 1979 and on or before the last year for which we have the applicable actual data published annually by the Social Security Administration (annual COLA, annual wage base for old and new law, and annual national average wage). Generally, the latest year will be the current calendar year but could be the year before depending on the timing of updates to the data used by the functions. The value entered in the *CompYr* parameter is used by the function to limit the value entered in the *LstSlYr* parameter (e.g., if 2014 is entered in the *CompYr* parameter and 2015 is entered in the *LstSlYr* parameter, the function will limit the original entry in the *LstSlYr* parameter to 2014). However, even when the value entered in the *LstSlYr* parameter is being limited to the value entered in the *CompYr* parameter, all actual earnings data provided in the range entered in the *Sl* parameter are used for estimating any missing earnings values. For example, if 2014 is entered in the *LstSlYr* parameter and 2012 is entered in the *CompYr* parameter and the earnings for 2012 are missing but the earnings for 2013 and 2014 are available, the estimated earnings for 2012 are determined from the earnings in 2013 even though the value for the *LstSlYr* parameter will be limited to 2012 and the worker's earnings used for the calculation will only be those up to through the 2012 earnings values. Therefore, the estimated earnings computed for any year are not affected by the value entered in the *CompYr* parameter, i.e., regardless of the value entered in the *CompYr* parameter, the earnings estimated for any year will always be the same.

Note The entry in this parameter is very important when performing calculations as of a particular date, e.g., DOPT, PC3 Date, Benefit Freeze Date, etc. It is important to note that function only limits the year entered in the LstSlYr parameter to the year entered in the CompYr parameter. If it is necessary to make the calculation with the earnings limited to a year that is before the year entered in the CompYr parameter, this limit has be applied before the year is entered into the LstSlYr parameter, e.g., if 2016 is entered in the CompYr parameter so that the function only uses annual COLA values through 12/31/2015, annual wage base values for the old and new law through 2016, and the annual national

wage values through 2014, but worker's annual earnings values only up to 2015 are to be used for the calculation, the user must enter 2015 in the LstSlYr parameter because the function will otherwise use the 2016 annual worker's earnings in the calculation. In the Social Security Administration's AnyPIA32 program, the computation year is set in the Properties menu. The computation year (4-digit year entered in the CompYr parameter) needs to be set in the AnyPIA32 program via the Properties menu before opening an input file created by the SSACALC function for use in the AnyPIA32 program.

Biasm: this is an optional numeric parameter for entering the projected benefit increase (projected annual COLA values) assumption for years after the last actual benefit increase used for the calculation. The last actual benefit increase used in the calculation is dictated by the year entered in the *CompYr* parameter as detailed in the guidance for the *CompYr* parameter above. The valid values are:

1 – Alternative 1 from last SSA Trustees' Report

2 – Alternative 2 from last SSA Trustees' Report

3 – Alternative 3 from last SSA Trustees' Report

5 or 0 – Flat, i.e., no benefit increases

7 – User Specified Percentage Increase Each Year (populate percentage(s) in *BiPct* parameter)

Note The primary insurance amount (Social Security benefit at full retirement date) is impacted by the assumption used for projected benefit increases. If the benefit is computed at a date that occurs in a year following the year in which the worker attains age 62, the primary insurance amount is increased using the projected COLA values for each year following the year in which the participant attains age 62 up to the year in which the benefit is being computed (if the BenDt parameter is populated, this is the date at which the benefit is being computed even if the benefit commenced at an earlier date, i.e., when the date entered in the Ntldt/Bntldt/Benttldt2 parameter is before the date entered in the BenDt parameter). For example, if the worker attains age 62 in 2028 and the benefit is being computed as of September, 2029, the projected benefit increase for December, 2028 will be used to increase the primary insurance amount so if the projected benefit increase for December, 2018 is 2% and the primary insurance amount is $3,000, the resulting primary insurance amount that will be returned by the function is $3,000.00 x 1.02 = $3,060.00.

Note When the projected wage base assumption is set to automatic (1 entered in Wbasm parameter), the projected wage base values are impacted by the assumption used for the projected benefit increases. If there is no projected benefit increases (0 or 5 entered in Biasm parameter), the projected wage bases will all be the same amount as the last actual wage base used in the calculation or at most there will be an increase only in the first projected wage base value and then all subsequent projected wage base values will be that same amount. If the last actual wage base used does not match the previous year wage base, there will be no increase to the projected wage base at all and if the last actual wage base used does match the previous year wage base, there will be an increase only for the first projected wage base value and then that same amount would be used for all subsequent projected wage base values.

BiPct: this is an optional numeric parameter for entering the benefit increase percentage(s) when a value of 7 is entered in the optional *Biasm* parameter. A valid range must be entered into this parameter (i.e., values cannot be directly entered into this parameter). The range entered must contain a single cell

or must contain 16 or 17 cells. If a range with a single cell is entered in the *BiPct* parameter, the value in that cell is used for each year following the last year in which an actual benefit increase is used (the last actual benefit increase used is the COLA that was published in December of the year before the year entered in the *CompYr* parameter, e.g., if 2016 is entered in the *CompYr* parameter, the last actual benefit increase used is the COLA published in December 2015 and then the user specified benefit increase percentages are used for December, 2016 and later). If a range with 16 or 17 cells is entered in the *BiPct* parameter, the percentage in each cell is used for each subsequent year following the last year in which an actual benefit increase is used, e.g., the percentage from the first cell in the range is used for the first year following the last year in which an actual benefit increase is used, the percentage from the second cell in the range is used for the second year following the last year in which an actual benefit increase is used, etc. The percentage in the last cell in the range is used for all subsequent years. A description that will be displayed on the detailed report from the Social Security Administration's ANYPIA32 program (when an input file is created from the SSACALC function) can be entered into the last cell in the range when a 17-cell range is provided. The first 16 cells in the range provided should contain a benefit increase percentage. The percentages entered in each cell specified by the range entered in the *BiPct* parameter should be entered as a decimal value rounded to 3 decimal places (the function will round entries with more than three decimal places). For example, if the range AA2:AQ2 (0.025, 0.035, 0.045, 0.015, 0.025, 0.035, 0.055, 0.45, 0.035, 0.025, 0.035, 0.045, 0.015, 0.025, 0.035, 0.055, "user-defined benefit increases") is entered in the *BiPct* parameter and the year 2016 is entered in the *CompYr* parameter, the function will use actual benefit increases through December 2015 and then use a 2.5% benefit increase for December 2016, a 3.5% benefit increase for December 2017, a 4.5% benefit increase for December 2018, a 1.5% benefit increase for December 2019, a 2.5% benefit increase for December 2012, a 3.5% benefit increase for December 2021, a 5.5% benefit increase for December 2022, a 4.5% benefit increase for December 2023, a 3.5% benefit increase for December 2024, a 2.5% benefit increase for December 2025, a 3.5% benefit increase for December 2026, a 4.5% benefit increase for December 2027, a 1.5% benefit increase for December 2028, a 2.5% benefit increase for December 2029, a 3.5% benefit increase for December 2030, a 5.5% benefit increase for December 2031 and later, and will display "user-defined benefit increases" on the detailed report generated by the Social Security Administration's ANYPIA32 program.

Awiasm: this is an optional numeric parameter for entering the assumption for projected increases in the national average wage (increases are specified as percentages that are used to determine the projected national average wage values) for years after the last actual national average wage used for the calculation. The last actual national average wage used in the calculation is dictated by the year entered in the *CompYr* parameter as detailed in the guidance for the *CompYr* parameter. The valid values are:

1 – Alternative 1 from last SSA Trustees' Report

2 – Alternative 2 from last SSA Trustees' Report

3 – Alternative 3 from last SSA Trustees' Report

5 or 0 – Flat, i.e., no increases to the national average wage

7 – User Specified Percentage Increase Each Year (populate percentage(s) in AwiPct parameter)

Note When the projected wage base assumption is set to automatic (1 entered in Wbasm parameter), the projected wage base values are impacted by the assumption used for the projected increases in the national average wage values. If there is no projected increases to the national average wage (0 or 5 entered in Awiasm parameter), the projected wage bases will all be the same amount as the last actual wage base used in the calculation or at most there will be an increase only in the first projected wage base value and then all subsequent projected wage base values will be that same amount. If the last actual wage base does not match the previous year wage base, there will be no increase to the projected wage base at all and if the last actual wage base used does match the previous year wage base, there will be an increase only for the first projected wage base value and then that same amount would be used for all subsequent projected wage base values.

AwiPct: this is an optional numeric parameter for entering projected increases used to determine future national average wage values when a value of 7 is entered in the optional *Awiasm* parameter. A valid range must be entered into this parameter (i.e., values cannot be directly entered into this parameter). The range entered must contain a single cell or must contain 17 or 18 cells. If a range with a single cell is entered in the *AwiPct* parameter, the value in that cell is used to determine the national average wage for each year following the last year in which an actual national average wage is used (the last actual national average wage used is the one published for the year two years before the year entered in the *CompYr* parameter, e.g., if 2016 is entered in the *CompYr* parameter, the last actual national average wage used is the one published for 2014 and then the user specified projected increases are used to determine the national average wage for 2015 and later). If a range with 17 or 18 cells is entered in the *AwiPct* parameter, the percentage in each cell is used to determine the national average wage for each subsequent year following the last year in which an actual national average wage is used, e.g., the percentage from the first cell in the range is used to determine the national average wage for the first year following the last year in which an actual national average wage is used, the percentage from the second cell in the range is used to determine the national average wage for the second year following the last year in which an actual national average wage is used, etc. The percentage in the last cell in the range is used to determine the national average wage for all subsequent years. A description that will be displayed on the detailed report from the Social Security Administration's ANYPIA32 program (when an input file is created from the SSACALC function) can be entered into the last cell in the range when an 18-cell range is provided. The first 17 cells in the range provided should contain a percentage to be used for determining the national average wage for the year corresponding to that cell.

The percentages entered in each cell specified by the range entered in the *AwiPct* parameter should be entered as a decimal value rounded to 4 decimal places (the function will round entries with more than four decimal places). For example, if the range AA2:AR2 (0.0254, 0.0354, 0.0454, 0.0154, 0.0254, 0.0354, 0.0554, 0.0454, 0.0354, 0.0254, 0.0354, 0.0454, 0.0154, 0.0254, 0.0354, 0.0554, 0.0454, "user-defined average wage increases") is entered in the *AwiPct* parameter and the year 2016 is entered in the *CompYr* parameter, the function will use actual national average wage values through 2014 and then use a 2.54% increase to determine the national average wage for 2015, a 3.54% increase to determine the national average for 2016, a 4.54% increase to determine the national average for 2017, a 1.54% increase to determine the national average for 2018, a 2.54% increase to determine the national average for 2019, a 3.54% increase to determine the national average for 2020, a 5.54% increase to determine the national average for 2021, a 4.54% increase to determine the national average for 2022, a 3.54% increase to determine the national average for 2023, a 2.54% increase to determine the

national average for 2024, a 3.54% increase to determine the national average for 2025, a 4.54% increase to determine the national average for 2026, a 1.54% increase to determine the national average for 2027, a 2.54% increase to determine the national average for 2028, a 3.54% increase to determine the national average for 2029, a 5.54% increase to determine the national average for 2030, 4.54% increase to determine the national average for 2031 and later years and will display "user-defined average wage increases" on the detailed report generated by the Social Security Administration's ANYPIA32 program.

Note The Social Security Trustees' Report is published in the 3rd quarter each calendar year. The plan is to update the SSACALC function with each BCV maintenance release. There typically is a period of time between the publication of the last SSA Trustees' Report and the subsequent BCV maintenance release. During this period of time the SSACALC function will use the assumptions for future benefit increases and future increases to the national average wage from the prior SSA Trustees' Report (when 1, 2, or 3 is entered in the Biasm and/or Awiasm parameters). For example, if the 2016 SSA Trustees' Report is published in July, 2016 and the subsequent BCV maintenance release is deployed in August, 2016, the SSACALC function will continue to be using the assumptions for future benefit increases and future increases to the national average wage from the 2015 SSA Trustees' Report until the BCV maintenance release is deployed in August, 2016, at which point the assumptions from the 2016 SSA Trustees' Report would then be used instead.

Note The assumptions for benefit increases and average wage increases from the SSA Trustees' Report are only available from the last SSA Trustees' Report. For example, if the last update to the function included the assumptions from the 2015 SSA Trustees' Report, these will be the only assumptions available regardless of the calculation year set in the CompYr parameter. So, if the last update was from the 2015 Trustees' Report and 1 is populated in the Biasm and Awiasm parameters, the assumptions used for future benefit increases and national average wage increases will be those from the 2015 Trustees' Report even if 2012 is populated in the CompYr parameter (i.e., the calculation won't be using the assumptions from the 2011 or 2012 Trustees' Report as might be expected based on the entry of 2012 in the Compyr parameter). If the assumptions from an earlier or later SSA Trustees' Report are needed for the calculation, these assumptions must be entered using the user-defined option for both benefit increase assumptions and increase assumptions for determining future national average wage values.

Note When 7 is entered in the Biasm and/or Awiasm parameters and a single cell range is entered in the BiPct and/or AwiPct parameters, the function creates a description for the ANYPIA32 program input file (when the creation of an ANYPIA32 program input file is specified). The description created is "Constant benefit increase percent: #.#%" and/or "Constant average wage increase percent: #.##%". The percentage in the description is the value entered in the BiPct and/or AwiPct parameters. The description contains the value entered in the BiPct and/or AwiPct parameters after rounding (i.e., the same rounded percentage contained in the input file that is created).

Bic: beneficiary code for the current spouse. This is an optional parameter.

If an old age benefit calculation is specified (1 enter in the *BenTp* parameter):

Enter B if the current spouse has attained age 62;

Enter B2 for a young spouse (can be any age but must have dependent children—generally under the age of 18 unless disabled or still in secondary school).

If a survivor benefit calculation is specified (2 entered in the *BenTp* parameter):

Enter D (current spouse of worker who is not a parent of worker's surviving child—must have attained age 60); or

Enter E (surviving parent of a worker's surviving child – no minimum age requirement); or

Enter C (surviving child or worker – no minimum age requirement).

BDOB: date of birth for current spouse. This is an optional parameter.

Bntldt: benefit commencement date for the current spouse. This is an optional parameter.

For a survivor benefit calculation (2 entered in the *BenTp* parameter):

The *Ntldt* parameter must be left unpopulated and the *BenDt* parameter must always be populated (not required to be populated for an old age benefit calculation) and the date entered in the *Bntldt* parameter (date at which survivor benefit is originally commenced) must be on or before the date entered in the *BenDt* parameter (date at which survivor benefit is being computed taking into consideration benefit increases that were applied between the original commencement date and the date entered in the *BenDt* parameter). The survivor benefit commencement date must be after the worker's date of death (date enter in the DOD parameter) and must be on or after the month in which the current spouse attains the age of 60.

For an old age benefit calculation (1 entered in the *BenTp* parameter):

The *Ntldt* parameter must always be populated. The *BenDt* parameter must be populated if the date entered in the *Bntldt* parameter is after the date entered in the *Ntldt* parameter (current spouse's benefit is commencing after the worker's benefit). The function allows a date to be entered in the *Bntldt* parameter (benefit commencement date for current spouse) that is before the date entered in the *Ntldt* parameter (benefit commencement date for the worker), but generally the current spouse cannot commence a benefit on the worker's benefit until the worker commences his/her benefit so the date entered in the Benttldt2 parameter should usually be on or after the date entered in the *Ntldt* parameter. When the date entered in the *Bntldt* parameter is before the date entered in the *Ntldt* parameter, the spouse's benefit returned is the benefit that commenced at the date entered in the *Bntldt* parameter and that is then payable at the date entered in the *Ntldt* parameter taking into account any benefit increases that would have been applied between the date at which the current spouse originally commenced his/her benefit and the date at which the worker commenced his/her benefit. If B is entered in the Bic parameter, the benefit commencement date must be after the month in which the current spouse attains age 62 (if born on the 1st or 2nd day of the month, the benefit can be commenced in the month in which the current spouse attains age 62). If B2 is entered in the Bic parameter, the benefit commencement date can be at any age.

Bic2: beneficiary code for the ex-spouse. This is an optional parameter.

If an old age benefit calculation is specified (1 entered in the *BenTp* parameter): Enter B6 (ex-spouse must have attained age 62).

If a survivor benefit calculation is specified (2 entered in the *BenTp* parameter): Enter D6 (ex-spouse must have attained age 60).

BDOB2: date of birth for ex-spouse. This is an optional parameter.

Benttldt2: benefit commencement date for the ex-spouse.

For a survivor benefit calculation (2 entered in the *BenTp* parameter):

The *Ntldt* parameter must be left unpopulated and the *BenDt* parameter must always be populated (not required to be populated for an old age benefit calculation) and the date entered in the *Benttldt2* parameter (date at which survivor benefit is originally commenced) must be on or before the date entered in the *BenDt* parameter (date at which survivor benefit is being computed taking into consideration benefit increases that were applied between the original commencement date and the date entered in the *BenDt* parameter). The survivor benefit commencement date must be after the worker's date of death (date enter in the *DOD* parameter) and must be on or after the month in which the current spouse attains the age of 60.

For an old age benefit calculation (1 entered in the *BenTp* parameter):

The *Ntldt* parameter must always be populated. The *BenDt* parameter must be populated if the date entered in the *Benttldt2* parameter is after the date entered in the *Ntldt* parameter (current spouse's benefit is commencing after the worker's benefit). The function allows a date to be entered in the *Benttldt2* parameter (benefit commencement date for current spouse) that is before the date entered in the *Ntldt* parameter (benefit commencement date for the worker), but generally the current spouse cannot commence a benefit on the worker's benefit until the worker commences his/her benefit so the date entered in the Benttldt2 parameter should usually be on or after the date entered in the *Ntldt* parameter. When the date entered in the Benttldt2 parameter is before the date entered in the *Ntldt* parameter, the spouse's benefit returned is the benefit that commenced at the date entered in the Benttldt2 parameter and that is then payable at the date entered in the *Ntldt* parameter taking into account any benefit increases that would have been applied between the date at which the current spouse originally commenced his/her benefit and the date at which the worker commenced his/her benefit. If B is entered in the Bic parameter, the benefit commencement date must be after the month in which the current spouse attains age 62 (if born on the 1st or 2nd day of the month, the benefit can be commenced in the month in which the current spouse attains age 62). If B2 is entered in the *Bic* parameter, the benefit commencement date can be at any age.

Pre78Qtrs: this is an optional numeric parameter for entering the quarters earned prior to 1978 if applicable based on the years of earnings included in the calculation. When years of earnings prior to 1978 are included in the calculation, a valid range must be entered in this parameter (i.e., values cannot be directly entered into this parameter). The range entered must contain a single cell or must contain a cell for each year of earnings prior to 1978 that are included in the calculation (e.g., if the earnings from 1970 to 1977 are included in the calculation, the range would need to contain eight cells, one for each year between 1970 and 1977). Prior to 1978, Social Security earnings were reported quarterly instead of annually with a quarter being awarded only if there were sufficient earnings in that quarter regardless of

the annual earnings in that year. The function does not allow for the entry of quarterly earnings so the quarters earned prior to 1978 have to be calculated separately and provided as an input to this function via this parameter. If a range containing a single cell is entered into this parameter, the value in that cell must be the total quarters earned prior to 1978 (total of quarters earned in all years prior to 1978). If a range containing a cell for each year prior to 1978 is entered in this parameter, each cell must contain the quarters earned in the year associated with the cell (e.g., if the range entered is AA2:AE2 and the cells contain (3, 4, 4, 2, 1), the function uses 3 earned quarters for 1973, 4 earned quarters for 1974, 4 earned quarters for 1975, 2 earned quarters for 1976, and 1 earned quarter for 1977). The values for each year must be between 0 and 4 and when a total for all years is provided, the total must be between 0 and 4 times the number of years prior to 1978 used in the calculation.

Calcdsc: this is an optional parameter for entering the description for the calculation, e.g., name of participant. If the function is used to generate an input text file (see the guidance in the *Rslt* parameter above) and then that input text file is read into the Social Security Administration's ANYPIA32 program, the description entered in the *Calcdsc* parameter will appear in the detailed report generated by the ANYPIA32 program.

Wbasm: this is an optional numeric parameter for specifying which set of assumptions will be used for the wage base values (old law and new law) for years after the last actual wage bases used for the calculation. The last actual wage bases used in the calculation are dictated by the year entered in the *CompYr* parameter as detailed in the guidance for the *CompYr* parameter. If no value is provided, *Wbasm* defaults to a value of 0. The valid values are:

> 0 – The last actual wage bases (old and new law) are used for all future years (i.e., no increase to the last actual wage base values used in the calculation). For example, if 2016 is entered in the *CompYr* parameter, the last actual wage values used are those for 2016 and these values will then be used for all years after 2016.
>
> 1 – The wage bases are increased automatically by the program based on rules followed by the Social Security Administration. 2 – User-defined future wage base values (future wage base values must be entered in the Wbnew and Wbold parameters).
>
> 3 – User-defined percentages to be used for determining future wage base values (percentages must be entered in the Wbnew and Wbold parameters).

Note If the entries in the BenIncAsmp and BenIncPct parameters result in there being no projected benefit increases or if the entries in the Awiasm and Awipct parameters result in there being no projected increase to the national average wage beyond the last actual national average wage used in the calculation, the automatic increase assumption for the wage base values (1 entered in Wbasm parameter) will result in at most one increase in the wage base values and then a flat wage base from that point forward, i.e., there will be at most one increase to the last actual wage base value used in the calculation (e.g., if the calculation year is set to 2016 and the entries in the BenIncAsmp and BenIncPct parameters result in there being no projected benefit increases beyond COLA for December 2015 or the entries in the Awiasm and Awipct parameters result in no increase beyond the 2014 national average wage, there will be no increase to the 2016 wage base for years that follow 2016). See the guidance for the BenIncAsmp and the Awiasm parameters for additional information on when there will be no increase to the last actual wage base and when there will be one increase to the last actual wage base.

WbNew: this is an optional parameter that will accept a range entry with up to 80 cells. The parameter must be populated if the *Wbasm* parameter is populated with 2 or 3. When the *Wbasm* parameter is populated with 2, the cells in the range provided must contain projected "current law" wage base values. When the *Wbasm* parameter is populated with 3, the cells in the range provided must contain percentages to use for projecting the "current law" wage base values. When the *Wbasm* parameter is populated with 3, the percentages in the range entered in the *WbNew* parameter are applied starting from the last actual wage base used in the calculation, which is determined by the 4-digit year entered in the *CompYr* parameter. For example, if 2015 is entered in the *CompYr* parameter, the first percentage is applied to the 2015 wage base to calculate the projected 2016 wage base, and then the second percentage is applied to the projected 2016 wage base to calculate the projected 2017 wage base, etc.

WbOld: this is an optional parameter that will accept a range entry with up to 80 cells. The parameter must be populated if the *Wbasm* parameter is populated with 2 or 3. When the *Wbasm* parameter is populated with 2, the cells in the range provided must contain projected "old law" wage base values. When the *Wbasm* parameter is populated with 3, the cells in the range provided must contain percentages to use for projecting the "old law" wage base values. The additional information above for the *WbNew* parameter applies to the *WbOld* parameter.

Note The function will accept ranges that vary in size from one cell to 80 cells for the two parameters WbNew and WbOld. When fewer than 80 cells are provided, the entry in the last cell in the range is used for the balance of the user-defined wage base values or user-defined percentages for projecting the wage base values, e.g., if the Wbasm parameter is populated with 3 and a range with one cell that contains 0.02 is entered in the WbNew parameter, a 2% increase will be applied to the wage base each year, starting with the last actual wage base used, to obtain the subsequent year projected wage base value.

Lstsldt: this optional parameter will accept a date value or a single cell range containing a date value. The date entered is used to annualize the actual earnings provided for the 4-digit year entered in the *LstSlYr* parameter. The date entered in the *Lstsldt* parameter is used only when the earnings for the 4-digit year entered in the *LstSlYr* parameter are known (provided in *Sl* parameter) and the year of the date entered in the *Lstsldt* parameter is the same as the 4-digit year entered in the *LstSlYr* parameter. The function will annualize the actual earnings provided in the salary range for the 4-digit year populated in the *LstSlYr* parameter. The function will annualize the earnings for the 4-digit year entered in the *LstSlYr* parameter before estimating any missing earnings for earlier years.

For example:

If *FstSlYr*: 2005, *LstSlYr*: 2010, *Lstsldt*: 05/31/2010, *SlTp*: 2010, *Sl*: 50000, 51000, 52000, 53000, 54000, 26,000, the function would set the earnings for 2010 to be 26000 x (365 / 151) = 62847.68; (01/01/2010 to 05/31/2010 is 151 days).

Fstsldt: this optional parameter will accept a date value or a single cell range containing a date value. The date entered is used to prorate the earnings being estimated for the 4-digit year entered in the *FstSlYr* parameter. The use of the date entered in the *Fstsldt* parameter is used only when the function is estimating the earnings for the 4-digit year entered in the *FstSlYr* parameter and not projecting earnings back to a 4-digit year that is earlier than the 4-digit year entered in the *FstSlYr* parameter (i.e., the 4-digit year entered in the *FstSlPrjYr* parameter is equal to the 4-digit year entered in the *FstSlYr* parameter or 0

is entered in the *BckPrjTp* parameter) and the year of the date entered in the *Fstsldt* parameter is the same the 4-digit year entered in the *FstSlYr* parameter. The function will prorate the estimated earnings for the 4-digit year populated in the *FstSlYr* parameter.

For example:

If *FstSlPrjYr* : 1999, *BckPrjTp*: 0, *FstSlYr*: 1999, *LstSlYr*: 2005; *Fstsldt*: 8/1/1999, *SlTp*: 2005,

Sl: none, none, 30000, 32000, 33000, 34000, 35000,

the function will estimate earnings for 2000 as $29,300.98; and

the function will estimate earnings for 1999 as $27,765.55 x (153 / 365) = $11,638.71.

ErnBckPct: this optional parameter will accept a decimal value or a single cell range containing a decimal value. The decimal entered in this parameter is used to determine the earnings for years that are before the first year covered by the range entered in the *Sl* parameter back to the year entered in the *FstSlYr* parameter. Earnings are still estimated using the standard method for any years without earnings that are included in the range entered in the *Sl* parameter, but earnings for years prior to the first year covered by the range entered in the *Sl* parameter back to the year entered in the *FstSlYr* parameter are determined using the decimal value entered (i.e., a fixed percentage decrease each year from the earnings for the first year in the range entered in the *Sl* parameter back to the earnings for the 4-digit year entered in the *FstSlYr* parameter). An entry in this parameter can be used with or without an entry in the optional *Fstsldt* parameter. The entry in this parameter is used only when the 4-digit year entered in the *FstSlYr* parameter is earlier than the first year covered by the range entered in the *Sl* parameter.

For example:

FstSlPrjYr: 1999, *BckPrjTp*: 0, *ErnBckPct*: 0.02, *FstSlYr*: 1999, *LstSlYr*: 2010, *Fstsldt*: 8/1/1999, *SlTp*: 2010, *Sl*: E2:M2

x	A	B	C	D	E	F	G	H	I
1	Year	1999	2000	2001	2002	2003	2004	2005	2006
2	Sal	None	None	None	None	30000	32000	33000	34000

x	J	K	L	M
1	2007	2008	2009	2010
2	35000	37000	39000	40000

The function will estimate/project earnings as follows:

2002 = $30,000 * ($33,252.09 / $34,064.95) = $29,284.14 (because 2002 is included in the range entered in the *Sl* parameter, we estimate the earnings for 2002 using the standard method)

2001 = $29,284.14 / 1.02 = $28,709.94 (because 2001 to 1999 are before the first year covered by the range entered in the *Sl* parameter and we have a percentage entered in the optional *ActErnBckPct* parameter, we use the percentage specified to project the earnings for these years)

2000 = $28,709.94 / 1.02 = $28,147.00

1999 as $28,147.00 / 1.02 = $27,595.10

$27,595.10 x (153 / 365) = $11,567.26.

Note If the earnings for 2006 were missing, they would be estimated from the 2007 earnings using the standard method.

Generally, when this option is used, the entry in the *FstSlPrjYr* parameter would match the entry in the *FstSlYr* parameter, but a value can be entered in the *FstSlPrjYr* parameter that is earlier than the value entered in *FstSlYr* parameter. The function will determine all the earnings back to the year entered in the *FstSlYr* parameter and pass these to the ANYPIA32 program. The ANYPIA32 program handles the projection (if one is specified) from the year entered in the *FstSlYr* parameter back to the year entered in the *FstSlPrjYr* parameter. In the example above if 1995 is entered in the *FstSlPrjYr* parameter and 1 or 2 was entered in the *BckPrjTp* parameter, the function would pass earnings for 1999 to 2010 and would allow the ANYPIA32 program to project the earnings for 1995 to 1998.

Note When FstSlPrjYr is earlier than FstSlYr, we do not prorate the earnings for FstSlYr so in this scenario we would pass $27,595.10 for 1999 instead of the prorated amount of $11,567.26 shown in the example above.

SSASAMPLE

09/30/2016

Format

SSASAMPLE(*Result, ParamSource, Compyr*)

Return

Based on entry in the Result parameter. The user can specify any of the following results:

Worker's Primary Insurance Amount - monthly Social Security benefit at full retirement date Maximum Family Benefit - maximum family benefit at full retirement date

Worker's Monthly Old Age Benefit Unrounded - unrounded monthly benefit at specified retirement date

Worker's Monthly Old Age Benefit Rounded - rounded monthly benefit at specified retirement date

Worker's Early Retirement Age Years - years age at specified retirement date

Worker's Early Retirement Age Months - months age at specified retirement date

Worker's Full Retirement Age Years - years age at full retirement date

Worker's Full Retirement Age Months - months age at full retirement date

Worker's Average Indexed Monthly Earnings - averaged indexed monthly earnings

Worker's Early Retirement Factor - early retirement factor for old age benefit at specified retirement date

Worker's Late Retirement Factor - late retirement factor for old age benefit at specified retirement date

Beneficiary/Survivor Benefit for Current Spouse - beneficiary benefit (paid while worker is living) when old age benefit calculation specified and survivor benefit when survivor benefit calculation specified

Beneficiary/Survivor Benefit for Former Spouse - beneficiary benefit (paid while worker is living) when old age benefit calculation specified and survivor benefit when survivor benefit calculation specified

Beneficiary/Survivor Early Retirement Factor for Current Spouse - early retirement factor for beneficiary benefit (paid while worker is living) when old age benefit calculation specified and early retirement factor for survivor benefit when survivor benefit calculation specified

Beneficiary/Survivor Early Retirement Factor for Former Spouse - early retirement factor for beneficiary benefit (paid while worker is living) when old age benefit calculation specified and early retirement factor for survivor benefit when survivor benefit calculation specified

Example

=SSASAMPLE("highPIA", "filename.pia", 2016)

Parameters

Result: this is a string parameter for specifying the result desired. The valid values are:

highPIA - worker's monthly Social Security benefit at full retirement date

highMfb - maximum family benefit at full retirement date

unroundedBenefit - worker's unrounded monthly benefit at specified retirement date

roundedBenefit - worker's rounded monthly benefit at specified retirement date

earlyRetAge-years - worker's years age at specified retirement date

earlyRetAge-months - worker's months age at specified retirement date

fullRetAge-years - worker's years age at full retirement date

fullRetAge-months - worker's months age at full retirement date

avgindmoearn - worker's averaged indexed monthly earnings

erf - early retirement factor for old age benefit at specified retirement date

lrf - late retirement factor for old age benefit at specified retirement date

spousebenefit - beneficiary benefit (paid while worker is living) when old age benefit calculation specified and survivor benefit when survivor benefit calculation specified for current spouse

benfbenefit - beneficiary benefit (paid while worker is living) when old age benefit calculation specified and survivor benefit when survivor benefit calculation specified for former spouse

spouseerf - early retirement factor for beneficiary benefit (paid while worker is living) when old age benefit calculation specified and early retirement factor for survivor benefit when survivor benefit calculation specified for current spouse

benferf - early retirement factor for beneficiary benefit (paid while worker is living) when old age benefit calculation specified and early retirement factor for survivor benefit when survivor benefit calculation specified

ParamSource: This is a string parameter to specify the input file name. The input file can be generated from the Social Security

Administration's ANYPIA32 program or from the SSACALC function.

CompYr: the computation year (enter as a 4-digit year). The year entered in this parameter controls which actual data values (annual COLA, annual wage base for old and new law, annual national average wage, and worker's annual earnings) are used in the calculation. This parameter behaves the same as in the SSACALC function, except that it applies to the entries in the input file rather than the parameters supplied to the function. See the guidance for the *CompYr* parameter provided with the SSACALC function for additional information.

SSAVAL

09/28/2017

Format

SSAVAL(*DataValue, YearValue, Source*)

Return

Returns the data value specified (national average wage, COLA, or wage base) for the year specified from the specified source (SSA_VAL table in the ATPBGC database or SSAaddin.dll).

Example

=SSAVAL("NAW", 2015, "ATPBGC") **returns 48098.63**

Parameters

DataValue - Code for the data value being requested:

NAW – National Average Wage

COLA – Cost of Living Adjustment

WBN – Wage Base under New Law

WBO – Wage Base under Old Law

YearValue – 4-digit year being requested

The earliest year is 1937

The latest year depends on the data value being requested

Source – Code for the source of the data

ATPBGC – SSA_VAL Table in the ATPBGC database SSAADDIN –

SSAaddin.dll C++ library used by the SSACALC function

Complex Parameters Common to Multiple Functions

The complex parameters in this section are common to multiple functions. The name for the parameter is not the same in every function but the guidance for the parameter regardless of the name is the same for all functions other than the exceptions noted under each parameter. The parameter name shown is the name of the parameter from NPVF2. Other names used for the same parameter in other functions are shown in parenthesis following the name of the parameter from NPVF2.

AnnType (CalcMethod, SAnnType, and AnnTp)

02/26/2016

This parameter accepts a 2-character string value or a single cell range that contains a 2-character string value that specifies the annuity calculation method used to compute the present value factor.

There are seven options:

- "AX": annual factor using Exact formula.
- "SX": semi-annual factor using Exact formula.
- "QX": quarterly factor using Exact formula.
- "MX": monthly factor using Exact formula.
- "SP": semi-annual factor using Woolhouse formula (1/4).
- "QP": quarterly factor using Woolhouse formula (3/8).
- "MP": monthly factor using Woolhouse formula (11/24).

BenForm (From_Code, To_Code, and Form)

10/30/2017

This parameter accepts a 3-character string value or a single cell range that contains a 3-character string value that specifies the benefit form used to compute the present value factor. The valid values for this parameter are dependent on the function (please see notes below).

There are six options:

- "SLA": life annuity, with or without a certain and/or temporary period.
- "JSC": joint and survivor annuity (contingent basis), with or without a certain and/or temporary period.
- "JSP": joint and survivor annuity (contingent basis) with a popup, with or without a certain and/or temporary period.
- "JSJ": joint and survivor annuity (joint basis), with or without a certain and/or temporary period.
- "CTN": certain annuity only.

• "JSN": non-standard joint and survivor with certain period annuity. For this type of annuity, if the primary annuitant dies before the contingent annuitant during the certain period, the benefit drops to the survivor amount, and if the contingent annuitant also dies prior to the end of the certain period, the survivor benefit amount is then paid for the balance of the certain period to the designated beneficiary.

Note The JSP benefit form above is only applicable for the BFCFAEQ, PBGCBFCF2, MAXLIM, and PBGCOFA functions.

Note The QPSAPVF function only allows the "SLA" and "CTN" options since the QPSA is always a single life form of annuity.

Method (IntMethod and SMethod)

12/28/2020

This parameter accepts a string value or a single cell range that contains a string value that specifies the type of interest rate structure and discounting method used to compute the present value factor. With the "L" option, the user can also include the stability period and the look back.

There are six options:

- "O": PBGC lump sum interest rate structure (also used for annuity factor calculations prior to 11/01/1993).
- "N": PBGC annuity interest rate structure (generally used for actuarial equivalence calculations that are not based on "applicable interest" specified in PPA 2006 417(e)).
- "L": PPA 2006 417(e) interest rate structure ("segment rates").
- "L**": PPA 2006 417(e) interest rate structure ("segment rate") with stability period code (** can be "PY" for Plan Year, "CY" for Calendar Year, "PQ" for Plan Quarter, "CQ" for Calendar Quarter, or "M" for Month).
- "L**#": PPA 2006 417(e) interest rate structure ("segment rate") with stability period code (** can be "PY" for Plan Year, "CY" for Calendar Year, "PQ" for Plan Quarter, "CQ" for Calendar Quarter, or "M" for Month) and with look back (# can be 1, 2, 3, 4, or 5).
- “LPBGC”: for computing the present value factor for lump sum calculations for plans that are processed under the new lump sum rules; to use this option, enter the DOPT in the interest and mortality parameters, and do not populate the DOPT parameter. In a future release, the plan anniversary will also be able to be omitted.

Under the L methods a payment is discounted for all months between the valuation date and the payment date using the interest rate applicable for the segment in which the payment occurs.

Note The first three L methods detailed above are currently only available in the functions INTCODE, ERFAEQ, LRFAEQ, BFCFAEQ, NPVF2, NPVF2_NP, NPVFSS, and NPVFSS_NP. The LPBGC method is only available in the functions NPVF2, INTCODE, and MORTCODE.

Note: There is one special scenario under which the stability period codes shown above with the L option ("PY" for Plan Year, "CY" for Calendar Year, "PQ" for Plan Quarter, "CQ" for Calendar Quarter, or "M" for Month), are used with the O and N options. When specifying the O or N interest method, entering a range containing a valid O or N interest rate structure in the interest rate parameter (BRD), entering a

code LS06SUYYYY or LS12SUYYYY in the mortality parameters (MMortality and FMortality), entering MMDD in the plan anniversary parameter (PHSorPY), and entering a date in the DOPT parameter (must fall in a stability period that starts on or after 2018 for LS06SUYYYY or on or after 2024 for LS12SUYYYY), the user must include the stability period in the Method parameter because a stability period is needed to be able to determine the calendar year in which the stability period starts which contains DOPT. The two-dimensional mortality improvement scale used to project the request IRS tables is based on the calendar year in which the stability period containing DOPT starts.
Therefore, a stability period code is included with the O or N option (e.g., OCY, NPY, OPQ, NM, etc.) in this special scenario.

BRD (XBRD and ObjBRD)

09/24/2018

This parameter accepts an integer value or an Excel range (containing a single interest rate, a block of interest rates, a date value, or a string value), a date value that specifies the annual interest rates, or a string value that specifies the interest rates used to compute the present value factor. From the entry in this parameter, the function builds a one-dimensional array with 126 annual interest rates.

Note This coincides with the 126 q's in each mortality table.

*Note If the Method parameter is set to "L**#" (includes stability period and look back), a date value or a range that contains a date value must be entered in the BRD parameter, no other options are allowed.*

Input as an integer value or as an Excel range that contains a single cell with an integer value:

The decimal value must greater than or equal to 0 and less than 1.0. Excel builds the array using the decimal value provided for all 126 annual interest rates. This is equivalent to inputting a 1 x 2 range that has that has the interest rate in the first cell and 999 in the second cell (e.g., 0.06 999).

Note This option is not allowed when "O" is entered in the Method parameter.

Note The option of entering as a single integer value is not allowed when "O" is entered in the Method parameter (for functions that include the Method parameter) and is not allowed with the EX function which only uses the PBGC lump sum interest rate structure.

Input as an Excel range containing a block of interest rates:

The range specified must contain two columns and can have between one and 126 rows.

If method = "O", the first row of the range should contain the immediate interest rate in the first column and the death benefit interest rate in the second column. The remaining rows in the range should contain the deferral rates in the first column and the number of years that rate is in effect in the second column (use 999 for life). Examples:

The standard range contains four rows that includes three different deferral rates.

0.0650	0.05
1.0575	7
1.0450	8

1.0400 999

A three row range is valid when there are only two different deferral rates.

0.0650 0.05

1.0450 7

1.0400 999

A two row range is valid when there is only one deferral rate.

0.0650 0.05

1.0400 999

Note If in the NPVFSS function, the Method (IntMethod and SMethod) parameter is populated with 'O', the BRD (XBRD and ObjBRD) parameter is populated with a date, and the SAnnType parameter is populated with 'PRE', a default interest rate of 5% is used in calculating the value of the pre-retirement single sum increasing fixed term death benefit. The default 5% interest rate is used for discounting the death benefit back from the payment date to the valuation date (usually DOPT). The IncScale parameter is used to specify the annual interest rate used to increase the death benefit from the valuation date to the payment date. If in the NPVFSS function, the Method (IntMethod and SMethod) parameter is populated with 'O', the SAnnType parameter is populated with 'PRE', and there is a need to use a value other than the default 5% interest rate for discounting the death benefit from the payment date to the valuation date, a valid interest rate structure (instead of a date) must be entered in the BRD (XBRD and ObjBRD) parameter in which the desired death benefit interest rate is specified in the second cell of the first row. If a valid interest rate structure is entered in lieu of entering a date in the Method (IntMethod and SMethod) parameter, the NPVFSS function will use the death benefit interest specified in the interest rate structure provided instead of the default 5% interest rate that is used when a date is entered in the Method (IntMethod and SMethod) parameter.

NPVFSS is the only function that uses the death benefit interest rate included in the 'O' method interest rate structure and this death benefit interest rate is only used by the NPVFSS function when the Method (IntMethod and SMethod) parameter is populated with 'O', the BRD (XBRD and ObjBRD) parameter is populated with a valid interest rate structure, and the SAnnType parameter is populated with 'PRE'. Also, NPVFSS is the only function that uses the default 5% death benefit interest rate detailed above and this is only used when the Method (IntMethod and SMethod) parameter is populated with 'O', the BRD (XBRD and ObjBRD) parameter is populated with a date, and the SAnnType parameter is populated with 'PRE'.

Note The interest rates in row 1 must be in the range from 0% to 99.9%. The deferral rates in the remaining rows must be entered in the format 1.xxxx, and in the range from 1.000 to 1.9999. The input range must be a region with two columns and at least 2 rows (if the deferral rate is always 4.0% only two rows would be needed with the immediate rate and death benefit rate in the first row and 1.04 999 in the second row). There is only one post-retirement interest rate that can be entered (the immediate rate in the first row). Two rows must be entered even if the deferral and immediate (post-retirement) rates are the same.

Note The "O" method is not applicable for the functions NEX, NNX, and NNXY which only use the PBGC select and ultimate annuity interest rate structure.

If method = "N" or "L", each row should contain an interest rate in the first column and the number of years that rate is in effect in the second column (use 999 for life). For example:

0.0500 20

0.0425 999

Or

0.0500 5

0.0525 15

0.0600 999

Etc.

Note Interest rates must be in the range from 0% to 99.99%. The input range can have up to 126 rows, but must have exactly two columns. If the range contains 126 rows, the second column in the last row must be set to 999 (the second column in the previous 125 rows would be set to 1). If the second column in the last row is not equal to 999 (range has less than 125 rows) it is equivalent to having an additional row in the range where the first column is 0 and the second column is 999. Using a 0% interest rate is uncommon so generally the second column in the last row will be set to 999 (i.e. use the rate in the last row for all future years).

Note The "N" or "L" method is not applicable for the functions DX, NX, EX, DXY, and NXY which only use the PBGC lump sum interest rate structure.

Input as a date value or as an Excel range that contains a single cell with a date value:

If Method = "O", the function will pull and use the PBGC lump sum rates (these were also the annuity rates prior to 11/01/1993) applicable for the date entered. The date entered must be on or after 10/01/1974 and on or before the end date for the last PBGC lump sum rates currently published.

Note The functions NEX, NNX, and NNXY only work with the PBGC select and ultimate annuity interest rate structure. These three functions do not include the Method parameter. When a date value is entered, the functions pull and use the PBGC select and ultimate annuity interest rates.

If Method = "N", the function will pull and use the PBGC select and ultimate annuity rates applicable for the date entered. The date entered must be on or after 11/01/1993 and on or before the end date for the last PBGC select and ultimate annuity rates currently published.

Note The functions DX, NX, EX, DXY, and NXY only work with the PBGC lump sum rate structure. These five functions do not include the Method parameter. When a date value is entered, the functions pull and use the PBGC lump sum rates.

If Method = "L", "L**", or "L**#" the function will pull and use either the 30-year Treasury rate ("applicable interest rate" for plan years before 2008) or the 417(e) segment rates ("applicable interest rate" for plan years after 2007) applicable for the date entered.

To specify the 30-year Treasury rate, enter "030TR" in the *PHSorPY* parameter. The date entered must be on or after 08/01/1993 and on or before the end date for the last 30-Year Treasury rate currently published.

To specify the 417(e) "applicable interest rate (either 30-year Treasure rate or 417(e) segment rates) when the Method parameter is set to "L**#", enter the valuation date in the BRD parameter and enter the plan anniversary "MMDD" in the *PHSorPY* parameter. The function will determine the plan year and the start date of the stability period. The function will use this information along with the lookback to identify which 30-year Treasure rate or 417(e) segment rate set to use for the calculation. The date entered in the BRD parameter must be on or after 01/01/1995 and must result in an interest rate date that is on or before the end date for the last 417(e) segment rates currently published. When the Method parameter is set to L**#, there is no validation between the date entered in the BRD parameter and the dates entered in the *MMortality* and *FMortality* parameters. This allows for the lookup of the interest rates at DOPT along with the lookup of mortality at NRD which is needed for determining the employee provided benefit at NRD due to employee contributions.

To specify the 417(e) "applicable interest rate (either 30-year Treasury rate or 417(e) segment rates) when the Method parameter is set to "L" enter the interest date in the BRD parameter and for the *PHSorPY* parameter do one of the following:

If the valuation date is before the beginning of the 2008 plan year enter "030TR" in the *PHSorPY* parameter;

If the valuation date is on or after the beginning of the 2008 plan year and the interest date entered is before 01/01/2013, enter "YYYY" (4-digit plan year) in the *PHSorPY* parameter (valid values are "2008", "2009", "2010", "2011", "2012", and "2013");

If the interest date entered is on or after 01/01/2013, leave the *PHSorPY* parameter blank (the plan year is not applicable for interest dates after 12/31/2012).

For the INTCODE function, follow this same procedure when the Method parameter is set to "L" or "L**" because the INTCODE function does not include mortality parameters.

To specify the 417(e) "applicable interest rate (either 30-year Treasury rate or 417(e) segment rates) when the Method parameter is set to "L**", enter an interest date in the BRD parameter and enter a valuation date in at least one of the mortality table parameters and enter a plan anniversary "MMDD" in the *PHSorPY* parameter.

*Note When the Method parameter is set to "L**" a date must be entered in at least one of the mortality table parameters.*

The function will determine the plan year for the calculation from the date entered in the mortality table parameter(s) and the plan anniversary entered in the *PHSorPY* parameter. The date entered in the BRD parameter must be set back from the date entered in the mortality table by at least one month and be no earlier than five months prior to the beginning of the stability period applicable for the

calculation. The date entered in the BRD parameter must be on or after 08/01/1993 and on or before the end date for the last 417(e) segment rates currently published. The INTCODE function does not include mortality table parameters and therefore when the method is set to "L" or "L**" in the INTCODE function, the user must set the *PHSorPY* parameter to "030TR" or "YYYY", or leave it blank as detailed in the previous paragraph (i.e. this paragraph is not applicable for the INTCODE function).

Note All references to the L methods, 30-year Treasure rates, and 417(e) segment rates above are currently only applicable to the functions INTCODE, ERFAEQ, LRFAEQ, BFCFAEQ, NPVF2, NPVF2_NP, NPVFSS, and NPVFSS_NP.

Input as a string value or as an Excel range that contains a single cell with a string value:

The string value must provide the equivalent of a block of interest rate values that includes at least one row with two cells. The interest rate and the number of years the interest rate is in effect must be separated by a comma and each additional interest rate (row) must be separated from the previous rate using a semicolon. For example, the string value for the block of values

0.0650 0.05

1.0575 7

1.0450 8

1.0400 999

is "0.0650,0.05;1.0575,7;1.0450,8;1.0400,999"

The string value for the block of values

0.0500 5

0.0525 15

0.0600 999

is "0.0500,5;0.0525,15;0.0600,999"

Only one interest rate is currently supported for each year. For exact calculations, the monthly rate is derived from the annual rate with the assumption that the interest rate can only change on whole year anniversaries of the valuation date.

MMortality and FMortality (TheMNameHandle & The FNameHandle, SMMortName & SFMortName, and SMortName)

09/24/2018

These two parameters accept a string value, a date value, or an Excel range (containing a string value or a date value) that specifies the mortality tables (male and female) used for the calculation. From the entry in this parameter, the function builds a one-dimensional array with 126 q's.

Note This coincides with the 126 annual interest rates in the interest rate array.

Note The mortality module was updated in the BCV Legacy 1.10 release to include support for a 1D| syntax that allows for additional options with one-dimensional mortality. Please see the one-dimensional mortality (1D| syntax) section below for guidance.

Note The mortality module was updated in the BCV Legacy 1.8 release to include support for two-dimensional mortality improvement scales and two-dimensional mortality. This capability was further enhanced in the BCV Legacy 1.9 and BCV 1.10 releases. Please see the two-dimensional mortality (2D| syntax) section below for guidance.

*Note If the Method parameter is set to "L**" (includes stability period), a date value or a range that contains a date value must be entered in the MMortality or FMortality parameter.*

*Note If the Method parameter is set to "O**" or "N**" (includes stability period), a mortality code of LS06SUYYYY or LS12CUYYYY or a range that contains a mortality code LS06SUYYYY or LS012UYYYY must be entered in the MMortality or FMortality parameter. This is a special scenario under which a stability period can be included in the O or N method.*

Note The ability to enter a date value or an Excel range containing a date value is currently available only in the functions MORTCODE, QX, PX, LX, ERFAEQ, LRFAEQ, BFCFAEQ, QPSAPVF, NPVF2, and NPVFSS. For all other functions a string value or a range containing a string value must be entered into the parameters.

Note The ability to enter a range containing a block of q's is supported only with the NPVF2_NP and NPVFSS_NP functions (please see the guidance for the NPVF2_NP and NPVFSS_NP functions for information). These are testing functions and not permitted in the final V1/VE spreadsheet.

Input as a string value or as an Excel range that contains a single cell with a string value: The string value for a single table must comply with the following standards:

String Character #	Value
1-4	Mortality Table Code from the ATPBGC database (e.g., GM83, 2F14, AA20, etc.)
5-7	Age offset, if any. Use M to set the table back ## years, use P to set the table forward ## years (e.g., M1, P14)
5-10	If no age offset, use characters 5-10 for the mortality projection, if any (e.g., CU1970, DM1989 -see below for details) *Note A two digit year for the mortality projection will still work for backward compatibility with plans already completed (e.g., CU70, DM89 placed in characters 5-8), but best practice going forward is to use a four digit year.*
OR	
7-12 or 8-13	If characters 5-6 contain an age offset that is less than 10 years, use characters 7-12 for the mortality projection, if any (e.g., CU1970, DM1989 -see below for details) and if characters 5-7 contain an age offset that is greater than 9 years, use characters 8-13 for the mortality projection, if any. *Note A two digit year for the mortality projection will still work for backward compatibility with plans already completed (e.g., CU70,*

	DM89 placed in characters 7-10 or 8-11), but best practice going forward is to use a four digit year.

Note Mortality Projection:

For the projection parameters, the StartYear should be determined from the BaseYear field of the MORT_NAME table in the ATPBGC database. The projection entry is XXYYYY, where XX is the code for the projection scale and YYYY is the year to which the table is being projected.

When mortality projection is used, the projection is made using the entry in the projection table, Sx, raised to the power of the number of years projected. The number of years projected is calculated by subtracting the four digit BaseYear of the mortality table (as found in table MORT_NAME in the AtPBGC database) from the four digit number following the projection code table. If the number following the projection code table is only two digits, then it is assumed to be in the 2000s if it is less than 50, and in the 1900s otherwise. It is recommended to use four digit projection years – the two digit case is intended only for backward compatibility with plans that have already been completed. The number of years of projection is not allowed to be negative.

For example, if the mortality table is "UP84" and the projection is "DM2002", the add-in function looks up the BaseYear of "UP84" (1984), subtracts it from 2002 to get 18, and then projects the UP84 table 18 years using male scale D. The algorithm to project a table follows:

$$q_x^{new} = q_x^{old} \times s_x^{\#\,years}$$

Where Sx is the projection scale entry at age x.

It is possible to specify a projection to earlier year, e.g., project a table with a base year of 2002 back to the year 2000. When projecting to an earlier year, the scale factors are raised to a negative power (e.g. a power of -2 when projecting from 2002 back to 2000).

When both an age offset and a mortality projection are used, the age offset is applied to the projection table also. For example, the parameter "GM83M6DF93" means 1) use GAM male 1983 mortality; 2) set age backward 6 years; 3) select the female projection table "DF", and apply a six year age setback; and 4) project 10 years using the projection table as set back.

Examples

(4) GM83, 4 characters for the male or female mortality table parameter where there is neither an age adjustment nor a projection.

(6) GM83M4, 6 characters for the male or female mortality table parameter where there is only an age adjustment of minus four (M4) and no projection.

(10) GM83DM2001, 10 characters for the male or female mortality table parameter where there is only a projection to the EndYear 2001.

(12) GM83M4DM2001, 12 characters for the male or female mortality table parameter where there is an age adjustment (M4) and projection to the EndYear 2001.

Mortality and Projection Tables Available in BCV

A list of all available standard mortality tables and projection scales can be found in the ATPBGC database. In the BCV Web Portal, select **AtPBGC -> Tables** from the left-hand navigation menu and select a database table from the **Select AtPBGC table** drop-down menu. A list of all available standard mortality tables is shown in the table called MORT_NAME, and a list of all available standard projection scales is shown in the table called PROJ_SCALE. If a table the user needs is not included in the database, the user may contact TRMD to have a new table added. See the information below on blending if a table is needed that can be obtained by blending mortality tables already available in the ATPBGC database.

Note "Applicable Mortality" per 417(e):

To obtain the "applicable mortality" per 417(e), use the following mortality table codes:

01/01/1995 to 12/31/2002 – AA20

01/01/2003 to End of 2007 Plan Year – GU94

Note Plans were able to elect an earlier effective date for the GAR 94 table in which case the dates of 12/31/2002 and 01/01/2003 shown above would be adjusted accordingly for the GAR 94 effective date adopted by the plan.

On or After Beginning of 2008 Plan Year to 12/31/2017 – LS00SUYYYY (where YYYY is the calendar year in which the applicable stability period begins,after which may be different from the plan year when the stability period is not the plan year).

PPA 2006 included a change to the "applicable mortality" which results in new mortality table for each calendar year starting in 2008. The base tables used are from the RP2000 mortality table. There are four base tables used (annuitant and non-annuitant for both males and females) and multiple one-dimensional mortality improvement scales used to derive the "applicable mortality" for each year. The mortality table code LS00 and the projection scale code SU are not found in the ATPBGC database but are reserved and recognized for derivation of the "applicable mortality" table per PPA 2006. The algorithm for deriving the "applicable mortality" table is quite complex and therefore is not included here.

Plan Years on or after 2018 and prior to 2024 – LS06SUYYYY (where YYYY is the calendar year in which the applicable stability period begins which may be different from the plan year when the stability period is not the plan year).

Plan Years on or after 2024 – LS12SUYYYY (where YYYY is the calendar year in which the applicable stability period begins which may be different from the plan year when the stability period is not the plan year).

The "applicable mortality" continues to change each year after 2017, but both the base tables and the mortality improvement scales used were changed from those used from 2008 to 2017. The base tables used after 2017 are from the RP2006 mortality table.

Note As a special case, when the mortality table is LS06SU2018, the user does not need to input the PHSorPY, tableInd, or DOPT parameters. This is allowed because in the case of LS06SU2018, the DOPT must be in a stability period that starts in 2018, so the code will fill in the appropriate values if they are

omitted.

There are four base tables used (annuitant and non-annuitant for both males and females) and multiple two-dimensional mortality improvement scales (previously one-dimensional mortality improvement scales were used) to derive the "applicable mortality" for each year. Another change is that instead of using the same mortality improvement scale each year, there is an updated mortality improvement scale each year. The mortality table code LS06 and the projection scale code SU are not found in the ATPBGC database but are reserved and recognized for derivation of the "applicable mortality" tables after 2017. The algorithm for deriving the "applicable mortality" table is quite complex and therefore is not included here.

Because the two-dimensional mortality improvement scale changes each year it is necessary to specify the DOPT in the optional DOPT parameter so that the correct two-dimensional mortality improvement scale is used for projecting the mortality table.

Note When "applicable mortality" needs to be used for calculating benefits and there is a need to project the "applicable mortality" for a year after DOPT (e.g., cash balance plans, EEC plans, etc.), it is important to use the rules in place at DOPT when projecting the "applicable mortality". The optional parameter DOPT can be populated with the DOPT to force the projection to be performed using the rules in place at DOPT. For example, if a plan terminates in a stability period that starts in 2017, the projection of the 2020 mortality table is performed using the rules in place at 2017 (RP2000 base tables and one-dimensional AA mortality improvement scales), but if the plan terminates in a stability period that starts in 2018, the projection of the 2020 mortality table is performed using the rules in place at 2018 (RP2006 base tables and applicable two-dimensional mortality improvement scales – MP16 and FP16). If the DOPT parameter is not populated, it is assumed to be the earlier of the date entered in the mortality parameters and 12/31/2017. Saying a plan terminates in 2017 means that the stability period containing the DOPT starts in 2017. It is possible for a plan to terminate in the 2017 calendar year but fall in a stability period that starts in an earlier year, and so the functions are set up to be able to determine the calendar year in which the stability period containing DOPT starts.

Specify a weighting or blending of mortality tables:

A weighted mortality table or a blending of mortality tables can be specified by including one or more mortality table codes as described above each with a weighting percentage. A maximum of four mortality tables can be specified for blending. The weighting percentage must be specified as a decimal value, precede each mortality table code, and be separated from the mortality table code with a comma. Each weighting percentage and mortality table set must be separated from the next set using a semicolon. A single set of weighting percentage and mortality table or multiple sets (up to four) are allowed. The weighting percentage can be greater than 1.0 (each of the final q's after blending will be limited to 1.0) or can be less than 0 (only applicable when blending multiple tables and at least one of the tables has a positive weighting percentage). An error will be returned if any of the q's after the blending are less than 0. If the mortality table code specifies either an offset or projection, the table is offset and projected before the blending is performed.

Note Beginning with the BCV Legacy 1.9 release, it is possible to weight a two-dimensional mortality table (one built from a one-dimensional mortality table that is projected using a two-dimensional mortality improvement scale or one read from the ATPBGC database) and possible to blend two-dimensional mortality tables with one-dimensional mortality tables and/or other two-dimensional

mortality table.

Examples:

1.1, UP84 – multiplies each of the q's for UP84 by 1.1

0.97, UP84 – multiplies each of the q's for UP84 by 0.97

0.99,2D|Table:RM14,Scale:MP14,ValYear:2018 – a two-dimensional mortality table is created and then each q from either the applicable column (non-generational mortality) or applicable diagonal (generational mortality) is multiplied by 0.99.

Note When only one mortality table is specified with a weighting factor, the weighting factor is applied only to q's that are less than 1.0 so that any q that was 1.0 in the original mortality table will still be 1.0 after the application of the weighting factor.

If multiple tables are being blended, the weighting factor specified for each table is applied to every q, including the q's that are equal to 1.0. The final q is always limited to 1.0.

0.5,GM83;0.5,GF83 – the q's for GM83 and GF83 are multiplied by 0.5 and added together

0.3, GM83DM2000;0.7GF83DF2000 – the q's for GM83 are projected to 2000 using scale DM and then multiplied by 0.3, the q's for GF83 are projected to 2000 using scale DF and then multiplied by 0.7, and then the resulting q's are added together.

0.3,2D|Offset:M6,Table:RM14,Scale:MP14,ValYear:2018;0.1,2U11M5AA2019;0.4,LS00SU2013M1GM2016;0.2,2D|Table:RF002D,Offset:P6,ValYear:2018

In the last example the following sets of weighted q's are being summed together:

1. A two-dimensional mortality table is created from which either the applicable column (non-generational mortality) or applicable diagonal (generational mortality) is multiplied by 0.3;

Note The offset specified results in a shift of six rows up and six columns to the left in the two-dimensional mortality table.

2. The one dimensional mortality table 2U11 (built on the fly) is set back five years and projected forward 8 years using scale AA that is also set back five years and then the resulting q's are multiplied by 0.1;

3. The one-dimensional mortality table LS00SU2013 (built on the fly) is set back one year and projected forward 3 years using scale GM that is also set back one year and then the resulting q's are multiplied by 0.4;

4. The applicable column (non-generational mortality) or applicable diagonal (generational mortality) from the two-dimensional mortality table RF002D (two-dimensional mortality table contained in the ATPBGC database) is multiplied by 0.2.

Note The offset specified results in a shift of six rows up and six columns to the left in the two-dimensional mortality table.

Input as a date value or as an Excel range that contains a single cell with a date value:

If Method = "O", the function will pull and use the PBGC lump sum mortality tables (these were also the annuity mortality tables prior to 11/01/1993) applicable for the date entered. The date entered must be on or after 10/01/1974 and on or before the end date for the last PBGC lump sum mortality tables currently published. If the date entered is before 11/01/1993, the *PHSorPY* parameter must be

populated with the health status code "0", "1", or "2" because the table used is dependent on the health status. If the date entered is on or after 11/01/1993, the *PHSorPY* parameter must be omitted or populated with "" because the table used is not dependent on health status.

If Method = "N", the function will pull and use the PBGC annuity mortality table applicable for the date entered. The date entered must be on or after 11/01/1993 and on or before the end date for the last PBGC annuity mortality table currently published. For any date entered, the *PHSorPY* parameter must be populated with the health status code "0", "1", or "2" because the table used is dependent on the health status.

Note Mortality for Contingent Annuitant:

When a joint life annuity ("JSC", "JSN", or "JSJ") is specified, dates are entered for the MMortality and FMortality parameters, and the Method parameter is "N" ("O" if date entered is before 11/01/1993), the function assumes that the gender of the contingent annuitant is the opposite of the primary annuitant and that the health status of the contingent annuitant is healthy unless the gender parameter is populated with a two characters, e.g., "MM" or "FF". For example:

- *If the primary annuitant is a healthy male, the healthy female mortality table will be used for the contingent annuitant;*
- *If the primary annuitant is a Social Security disabled female, the healthy male mortality table will be used for the contingent annuitant.*

With contingent annuitant that has the same gender as the primary annuitant (e.g., same sex marriage), it is important to enter either "MM" or "FF" in the gender parameter so that the appropriate mortality table code will be used for the contingent annuitant. For example if the gender parameter is populated with "FF":

- If the primary annuitant is a Social Security disabled female, the healthy female mortality table will be used for the contingent annuitant (if the gender parameter is populated with just "F", the healthy male mortality table will be used for the contingent annuitant.

If Method = "L", "L**", or "L**#", the function will pull and use the "applicable mortality" table per 417(e). The date entered must be on or after 01/01/1995 and on or before 12/31/2099. For any date entered, the *PHSorPY* parameter must be populated with the plan anniversary, "MMDD" because the table used is the applicable table for the calendar year in which the stability period begins.

Note When the Method parameter is set to "L", the only allowed entry in the PHSorPY parameter is "0101" because with a plan anniversary of 01/01, the stability period is not needed to determine the calendar year in which the stability period commences.

The function uses the stability period specified in the Method parameter, the date entered in *MMortality* or *FMortality* along with the plan anniversary to determine the calendar year in which the stability period begins. For example:

If Method is "LPY", *MMortality* is 04/01/2014 and *PHSorPY* is "0601", the applicable calendar year is determined to be 2013.

The "applicable mortality" is based on the calendar year in which the stability period commences. For example, if the date entered in *MMortality* is 04/01/2014 and the stability period is the plan year and the plan anniversary is June 1, the valuation date falls in the stability period that runs from 06/01/2013 to 05/31/2014 and therefore the "applicable mortality" for 2013 is used whereas if the stability period was the calendar year, the valuation date would fall in the stability period that runs from 01/01/2014 to 12/31/2014 and therefore the "applicable mortality" for 2014 would be used. There are a couple of exceptions:

1. If the valuation date is in 2003 but the stability period containing the valuation date starts in 2002, the post-2002 mortality (GAR94) is used by the function because it was required to be used for any distributions occurring on or after 1/1/2003 regardless of when the stability period containing the distribution started.

2. If the valuation date is before the beginning of the 2008 plan year but the stability period containing the valuation date starts in 2008, the pre-2008 mortality (GAR94) is used by the function because plans did not have to start using the 2008 mortality until the beginning of the 2008 plan year.

If method = "L", a date can be entered in either *MMortality* or *FMortality* only if *PHSorPY* is "0101" (January, 1 plan anniversary). This is due to the fact that stability period is unknown with method = "L" and therefore the calendar year in which the stability period commences can only be known for sure if the plan anniversary January 1 (i.e., the plan year is the same as the calendar year).

If a date is entered in BRD and in both *MMortality* and *FMortality* and the method is "L", or "L**", the dates entered in *MMortality* and *FMortality* must be the same or an error will be returned (different dates can be entered in *MMortality* and *FMortality* the method is L**#).

Note Early Adoption of GAR 94 or 2008 Mortality:

The latest effective date allowed for the GAR 94 mortality table is 01/01/2003 but plans could adopt an earlier effective date for the use of the GAR 94 mortality table. For example, if the stability period was the plan year and the plan anniversary was June 1, the plan may have started using the GAR94 table with the beginning of the 2002 plan year on 6/1/2002 since that plan year ended after 1/1/2003. If the plan adopted the use of the GAR94 table before 1/1/2003, the mortality code of GU94 must be provided in lieu of a date for valuation dates that occur between the adoption date for the use of the GAR94 table and 1/1/2003.

The latest effective date allowed for the 2008 mortality table is the first day of the 2008 plan year but plans could adopt an earlier effective date for distributions that occurred on or after 1/1/2008. For example, if the stability period was the calendar year and the plan anniversary was June 1, the plan may have started using the 2008 mortality table with the beginning of the stability period that ran from 1/1/2008 to 12/31/2008 since that stability period ended after the beginning of the 2008 plan year on 6/1/2008. If the plan adopted the use of the 2008 mortality table before the first day of the 2008 plan year, the mortality code of LS00SU2008 must be provided in lieu of a date for the valuation dates that occur between the adoption date for use of the 2008 mortality table and the first day of the 2008 plan year.

Note When DOPT falls in a stability period that starts in 2018 or later, it is critical to populate the optional DOPT parameter so that the applicable mortality is projected using the RP2006 base tables and the applicable two-dimensional mortality improvement scales. If the DOPT parameter is not populated, the projection is performed using the rules in place prior to 2018 (RP2000 base tables and one-dimensional AA mortality improvement scale).

One-Dimensional Mortality (1D| Syntax)

A new one-dimensional mortality 1D| syntax was added in the BCV Legacy 1.10 release. The new 1D| syntax allows for some additional type of one-dimensional mortality calculations not previously supported.

1. The ability to blend multiple tables and then apply an offset to the blended table;
2. The ability to specify an offset for a non-integral number of years (specified in months);
3. The ability to use different generational settings for each mortality table be blended;
4. The ability to blend multiple tables and then apply a projection to the blended table;
5. The ability to blend multiple tables and then blend the blended table with other tables. The one-dimensional 1D| syntax:

1D|Table:TableCode,Scale:ScaleCode,ProjYear:YYYY, Offset/OffsetAge:OffsetCode (use either Offset or OffsetAge),GEN:GenCode

TableCode: This can be any valid entry than can be entered in the MMortlity and FMortality parameters as detailed above, e.g. AA20, GM83M4AA1990, 0.5,GM83;0.5,GF83, etc.

ScaleCode: This must be a valid one-dimensional mortality improvement scale code from the PROJ_SCALE_TABLE in the ATPBGC database. If the blending of multiple mortality tables is specified in TableCode, each table must have the same base year. Scale is an optional tag.

YYYY: This is the 4-digit projection year. ProjYear must be included when Scale is included and must not be included when Scale is not included.

OffsetCode: This must be one of the following:

Pyy or Myy – offset of an integral number of years (yy can be 1 to 99)

PMmmmm or MMmmmm – offset of a non-integral number of years specified in months (mmmm can be 1 to 1,199) PMQmmmm or MMQmmmm – offset of a non-integral number of years specified in months (mmmm can be 1 to 1,199)

The difference between MMmmmm / PMmmmm and MMQmmmm / PMQmmmm is in how the offset is applied. With MMmmmm / PMmmmm, the L's for each integral age are determined from the q's and then the L's for non-integral ages are determined using linear interpolation and then the offset specified is applied to the L's. With MMQmmmm /

PMQmmmm, the q's for each non-integral age are determined using linear interpolation between the original q's and then the offset specified is applied to the q's to come up with a new set of q's.

Offset/OffsetAge is an optional tag. There is no difference between Offset and OffsetAge.

GenCode: This must be a valid one-dimensional mortality improvement scale code from the PROJ_SCALE_TABLE in the ATPBGC database. When the GEN tag is included, generation mortality is used. GEN is an optional tag.

The generation mortality setting can be specified using the optional GEN tag or using the MGEN and FGEN parameters. If the GEN tag is included, nothing should be populated in the MGEN and FGEN parameters and if a value is entered in the MGEN and FGEN parameters, the GEN tag should not be included. The use of the GEN tag allows for separate generational settings for each mortality table specified (when more than one is specified, i.e. blending) whereas an entry in the MGEN and FGEN parameters applies to all the mortality tables specified.

The tags Table, Scale, ProjYear, OffsetAge/Offset, and GEN can be specified in any order.

Examples:

> "1D|Table:GM83,Scale:AA,ProjYear:1990,Offset:P3,GEN:AA"
> "1D|Table:GF83,ProjYear:2018,Scale:CU" "1D|ProjYear:1995,Table:GM71,Scale:AA"
>
> "1D|Table:06/15/2015,ProjYear:2018,Scale:AM" (the mortality table for 06/15/2015 per the interest method O, N, or L and the health status or plan anniversary is used as the base table which is projected using the AM one-dimensional scale)
>
> "1D|Table:GM83P5AA1990,ProjYear:2018,Scale:AM" (the GM83 table is set forward 5 years and then projected to 1990 using the one-dimensional projection scale AA and then the resulting table is projected using the AM one-dimensional scale)
>
> "1D:Table:0.5,GM83;0.5,GF83,ProjYear:2018,Scale:CU" (50% of the GM83 is blended with 50% GF83 and then the resulting table is projected using the CU one-dimensional scale).

Two-Dimensional Mortality (2D| Syntax)

The ability to use two-dimensional mortality was added in the BCV Legacy 1.8 release and then enhanced in the BCV Legacy 1.9 and 1.10 releases. A one-dimensional mortality table can be projected out to a two-dimensional mortality table using a two-dimensional mortality improvement scale from the MORT_IMPRVMT_SCALE table in the ATPBGC database. Any valid one-dimensional mortality table entry is allowed when specifying the one-dimensional mortality table that is to be projected using the two-dimensional mortality improvement scale. For example, the user can enter a mortality table code contained in the MORT_NAME table, a date that is used to lookup the mortality table, a mortality table code that is used to build a mortality table on the fly (e.g., 2M06, DM06, LS00SU2008, etc.), an offset (e.g., P4, M15, etc.), a one-dimensional projection (e.g., GM83AA1990, GF83AA1997, etc.), and a weighting of a single table or a blending of up to four one-dimensional mortality tables (e.g., 0.90,AA20, 0.5,GM83;0.5,GF83, etc.) Also, the TWO_D_MORT_TABLE table in the ATPBGC database contains two-dimensional mortality tables that can be used directly (i.e., projection of a one- dimensional mortality table to a two-dimensional mortality table using a two-dimensional mortality improvement scale already performed). Generational mortality (diagonal of q values all from different years) is the default used for the calculation but also the use of a specific year of q values (column of q values all for the same year) is supported.

Note To specify the use of q values for a specific year, see the GEN tag in this section and MGen and FGen guidance.

Note If blending of multiple one-dimensional mortality tables is specified, the one-dimensional mortality tables must all have the same base year. If a one-dimensional projection is specified on one of the one-dimensional mortality tables, the base year is the year of projection, e.g., 0.5,GM83;0.5,GM71AA1983 is valid because the base year for both tables is 1983.

To project a one-dimensional mortality table from the MORT_TABLE table in the ATPBGC database using a two-dimensional mortality improvement scale from the MORT_IMPRVMT_SCALE table in the ATPBGC database, enter:

2D|Table:TableCode,Scale:ScaleCode,ValYear:YYYY,Offset/OffsetAge:OffsetCode (use either Offset or OffsetAge),GEN:Y/N

TableCode: This can be any valid entry than can be entered in the MMortlity and FMortality parameters as detailed above, e.g. AA20, GM83M4AA1990, 0.5,GM83;0.5,GF83, etc.

ScaleCode: This must be a valid two-dimensional mortality improvement scale code from the MORT_IMPRVMT_SCALE_NAME table in the ATPBGC database.If the blending of multiple mortality tables is specified in TableCode, each table must have the same base year.

YYYY is the valuation year

OffsetCode: This must be Pyy or Myy – offset of an integral number of years (yy can be 1 to 99) The Offset/OffsetAge tag is optional (see below for the difference between these two tags)

Y/N is the setting for generational (Y) or non-generational (N) mortality – The GEN tag is optional The tags Table, Scale, ValYear, Offset/OffsetAge, and GEN can be entered in any order.

Examples:

"2D|Table:RF00,Scale:FP14,ValYear:2018,Offset:P3,GEN:N" "2D|Table:RF00,ValYear:2018,Scale:FP14" "2D|ValYear:2018,Table:RF00,Scale:FP14"

"2D|Table:06/15/2015,ValYear:2018,Scale:MP14" (the mortality table for 06/15/2015 per the interest method O, N, or L and the health status or plan anniversary is used as the base table which is projected using the MP14 two-dimensional scale)

"2D|Table:GM83P5AA1990,ValYear:2018,Scale:MP14" (the GM83 table is set forward 5 years and then projected to 1990 using the one-dimensional projection scale AA and then the resulting table is projected using the MP14 two-dimensional scale)

"2D:Table:0.5,GM83;0.5,GF83,ValYear:2018,Scale:MP14" (50% of the GM83 is blended with 50% GF83 and then the resulting table is projected using the MP14 two-dimensional scale).

To use a two-dimensional mortality table from the TWO_D_MORT_TABLE in the ATPBGC database, enter: "2D|Table:MMMMMM,ValYear:YYYY,Offset/OffsetAge:OffsetCode (use either Offset or OffsetAge),GEN:Y/N

MMMMMM is a two-dimensional mortality table code, the table codes can contain fewer than six-characters (standard code length) but the key is that the code exists for a two-dimensional mortality table in the TWO_D_MORT_TABLE

YYYY is the valuation year

OffsetCode: This must be Pyy or Myy – offset of an integral number of years (yy can be 1 to 99) The Offset/OffsetAge tag is optional (see below for the difference between these two tags)

Y/N is the setting for generational (Y) or non-generational (N) mortality – The GEN tag is optional The tags Table, Scale, ValYear, Offset/OffsetAge, and GEN can be entered in any order.

The generation mortality setting can be specified using the optional GEN tag or using the MGEN and FGEN parameters. If the GEN tag is included, nothing should be populated in the MGEN and FGEN parameters and if a value is entered in the MGEN and FGEN parameters, the GEN tag should not be included. The use of the GEN tag allows for separate generational settings for each mortality table specified (when more than one is specified, i.e. blending) whereas an entry in the MGEN and FGEN parameters applies to all the mortality tables specified.

Examples:

"2D|Table:RF002D,ValYear:2018,OffsetAge:P3,GEN:Y" "2D|Table:RF002D,ValYear:2018" "2D|ValYear:2018,Table:RF002D"

The difference between Offset and OffsetAge is that Offset results in a shift left or right and up or down whereas OffsetAge results only in a shift up or down.

For Offset:

When generational mortality is specified (GEN tag set to 'Y' or MGen and FGen parameters set to ‘Y’ or left blank), the offset is applied along a diagonal of q values in the two-dimensional table. For example, if the offset is P3, the q used for age 55 in 2018 will be the q for age 58 in 2021, the q used for age 56 in 2019 will be the q for age 59 in 2022, etc.

Note The shift to both age and year along diagonal.

When non-generational mortality is specified (GEN tag set to 'N' or *MGen* and *FGen* parameters set to ‘N’), the offset is applied along a column of q values in the two-dimensional table. For example, if the offset is P3, the q used for age 55 in 2018 will be the q for age 58 in 2021, the q used for age 56 in 2018 will be the q for age 59 in 2021.

Note The shift to both the age and year, i.e., there is shift in the column used in the two-dimensional table.

The column used is for valuation year +/- the offset value.

For OffsetAge:

When generational mortality is specified (GEN tag set to 'Y' or *MGen* and *FGen* parameters set to ‘Y’ or left blank), the diagonal of q values in the two-dimensional table is shifted up or down. For example, if the offset is P3, the q used for age 55 in 2018 will be the q for age 58 in 2018, the q used for age 56 in 2019 will be the q for age 59 in 2019, etc.

Note The shift is only to the age and not the year.

When non-generational mortality is specified (GEN tag set to 'Y' or *MGen* and *FGen* parameters set to 'N'), the offset is applied along a column of q values in the two-dimensional table. For example, if the offset is P3, the q used for age 55 in 2018 will be the q for age 58 in 2018, the q used for age 56 in 2018 will be the q for age 59 in 2018

Note The shift is only to the age and not the year, i.e., there is no shift in the column used in the two-dimensional table.

The column used is for valuation year specified.

Note An offset of a non-integral number of years is not supported with 2-dimensional mortality (i.e., only supported with 1-dimensional mortality when using the 1D | Syntax).

MGen and FGen (SMGen & SFGen)

03/29/2018

One-Dimensional Mortality

For one-dimensional mortality (see below for two-dimensional mortality), the parameter accepts a 2-character string value or an Excel range containing a single cell with a 2-character string value that matches one of the one-dimensional mortality improvement scales contained in the ATPBGC database. Populating the *MGen* and *FGen* parameters specifies the use of generational projection in the calculation along with the one-dimensional mortality improvement scales used for projecting the death probabilities. For example, "CU" implies using the unisex one-dimensional mortality improvement scale C projection to calculate *qx* for each year in the future. Enter blank string ("") or "NA" if these parameters are not applicable. The algorithm to project the death probability is:

$$q_x^{new} = q_x^{old} \times s_y^{r}$$

Where r = (x minus the valuation age).

Under generational projection, any age offset applied to the base mortality table is not applied to the one-dimensional mortality improvement scale (this is different from the procedure when both an offset and projection are specified in the mortality table code, see MMortality_and_FMortality parameters). Both generational projection and non-generational projection (this is projection specified in the mortality table code) can be used at the same time. In generational projection, the q for each age x after the valuation age (age in ANB parameter) is projected forward using the factor for age x from the mortality improvement scale specified for (x – valuation age) years. Therefore, the final q for a specific age will vary depending on the valuation age in the calculation.

If the blending of multiple one-dimensional mortality tables is specified, e.g. "0.5,GM83;0.5,GF83" in the mortality parameters and generational mortality is specified, e.g. "AA" in the generational mortality parameters, the blending is performed first and then the generational mortality is applied to the blended table. The 1D| GEN tag (see 1D| syntax section under MMortality and FMortality parameters) must be used in order to apply generational mortality separately to each table being blended, e.g. to

apply generational mortality to GM83 mortality table using the AM scale and apply generational mortality to GF83 mortality table using the AF scale prior to the blending, "0.5,1D|Table:GM83,GEN:AM;05.,1D|Table:GF83,GEN:AF".

Two-Dimensional Mortality

For two-dimensional mortality, the parameter accepts a 1-character string value or an Excel range containing a single cell with a 1- character string value that is either 'Y' or 'N' ('Y' is the default value when left blank). 'Y' specifies generational mortality and 'N' specifies non-generational mortality.

When two-dimensional mortality is specified, generational mortality will be assumed for the calculation. This means that, if the age at the valuation date is 65 and the valuation year is 2018, the q for 65 will be from 2018 and the q for 66 will be from 2019, etc. To specify non-generational mortality, i.e., the q's only for a specific year covered by the two-dimensional mortality table are used, set the MGen and/or FGen parameters to 'N'.

If the blending of multiple two-dimensional mortality tables is specified, e.g., "0.5,2D|Table:RM14,Scale:MP14,ValYear:2016;0.5, 2D|Table:RF14,Scale:FP14,ValYear:2016" in the mortality parameters, the setting in the generational mortality parameters, e.g. "Y" applies to each of the two-dimensional mortality tables being blended (i.e., either a column of q's are used from each two-dimensional mortality table or a diagonal of q's is used from each two-dimensional mortality table). The 2D| GEN tag (see 2D| syntax section under *MMortality* and *FMortality* parameters) must be used in order to specify different generational mortality settings for each two-dimensional mortality table being blended, e.g. to use a column of q's from one of the two-dimensional mortality tables (non-generational mortality) and a diagonal of q's from another one of the two-dimensional mortality tables (generational mortality) for the blending, e.g. "0.5,2D|Table:RM14,Scale:MP14,ValYear:2016,GEN:Y;0.5, 2D|Table:RF14,Scale:FP14,ValYear:2016,GEN:N".

If the blending of both one-dimensional mortality tables and two-dimensional mortality tables is specified, e.g., "0.5,2D|Table:RM14,Scale:MP14,ValYear:2016;0.5,GF83AA2016" in the mortality parameters, the only values allowed in the generational mortality parameters are those that apply to two-dimensional mortality tables. The 1D| and 2D| GEN tags (see 1D| and 2D| syntax sections under MMortality and FMortality parameters) must be used in order to specify generational mortality for the one-dimensional mortality tables included in the blending when the blending also includes two-dimensional mortality tables, e.g. "0.5,2D|Table:RM14,Scale:MP14,ValYear:2016,GEN:Y;0.5,1D|Table:GF83AA2016,GEN:AA"

Note With two-dimensional mortality, MGen and FGen can be set to different values if desired (e.g., if MGen is set to 'Y' and FGen is set to 'N', generational mortality will be used with the male mortality table and non-generational mortality will be used with the female mortality table).

Note With the 1D| or 2D| GEN tag is used (see 1D| and 2D| syntax sections under MMortality and FMortality parameters), nothing should be populated in the MGEN and FGEN parameters, i.e. don't use the 1D| or 2D| GEN tag in combination with an entry in the MGEN and FGEN parameters.

PHSorPY

02/26/2016

The parameter accepts a string value or an Excel range containing a single cell with a string value. The value in this parameter is dependent both on the function and on the entries in the Method, BRD, and *MMortality* and *FMortality* parameters.

For the function QPSAPVF, this parameter should be populated with the participant's health status code (PHS field) of "0", "1", or "2".

For functions other than QPSAPVF, follow the guidance below except that when using the functions LX, QX, or PX to perform a calculation for the contingent annuitant of a joint life annuity, always use the healthy mortality code of "0" wherever "participant's health status code" is specified below:

- If Method is set to "O" and no date is entered *MMortality* and *FMortality* or the dates entered in *MMortality* and *FMortality* are on or after 11/01/1993, *PHSorPY* should either be omitted or set to "".
- If Method is set to "O" and the date entered in *MMortality* or *FMortality* is before 11/01/1993, *PHSorPY* should be populated with the participant's health status code (PHS) of "0", "1", or "2".
- If Method is set to "N" and no date is entered *MMortality* and *FMortality*, *PHSorPY* should either be omitted or set to "".
- If Method is set to "N" and a date is entered in *MMortality* or *FMortality*, *PHSorPY* should be populated with the participant's health status code (PHS) of "0", "1", or "2".
- If Method is set to "L" and no date is entered in BRD, *MMortality*, and *FMortality*, *PHSorPY* should either be omitted or set to "".
- If Method is set to "L" and no date is populated in *MMortality* and *FMortality* and the date entered in BRD is on or after 01/01/2013, *PHSorPY* should either be omitted or set to "" for the 417(e) segment rates or set to "030TR" for the 30-Year Treasury rates.
- If Method is set to "L" and no date is populated in *MMortality* and *FMortality* and the date entered in BRD is before 01/01/2013, *PHSorPY* should set to "YYYY" for the 417(e) segment rates where YYYY is the applicable plan year or set to "030TR" for the 30-Year Treasure rates (note if the valuation date is before the beginning of the 2008 plan year, enter "030TR").
- If Method is set to "L" and a date is entered in *MMortality* or *FMortality*, *PHSorPY* should be set to "0101" where the plan anniversary is January 1. If the plan anniversary is not January 1, a date cannot be entered in *MMortality* or *FMortality* when the Method is set to "L".
- If Method is set to "L**" or "L**#", *PHSorPY* should be set to "MMDD" where MMDD is the plan anniversary.

The function will return error codes when values are entered in the *PHSorPY* parameter that are not consistent with the function (i.e. QPSAPVF versus other functions) or not consistent with the values entered in Method, BRD, *MMortality*, and *FMortality* parameters.

TableInd

07/12/2024

This parameter accepts a direct entry of 0, 1, 2, 3, 4, 5, 6, or 7 or an Excel range containing a single cell with 0, 1, 2, 3, 4, 5, 6, or 7. This parameter is only applicable when specifying the use of IRS mortality tables from 2008 and later. The default value is 0. The codes are described below:

0 Published IRS 417(e) Applicable Mortality Tables (default value) - 50/50 blend of the IRS Static Male and Female Combined Mortality Tables

1 Published IRS Static Non-Annuitant Mortality Male and Female Tables - RP2000 Non-Annuitant Mortality projected using Scale AA (from 2008 to 2017), or RP2006 Non-Annuitant Mortality projected using the applicable two-dimensional Mortality Improvement Scale (after 2017)

2 Published IRS Static Annuitant Mortality Male and Female Tables - RP2000 Annuitant Mortality using Scale AA (from 2008 to 2017), or RP2006 Annuitant Mortality projected using the applicable two-dimensional Mortality Improvement Scale (after 2017)

3 Published IRS Static Combined Male and Female Tables - weighted blend of the IRS Static Non-Annuitant and Annuitant Mortality Tables

4 Published IRS Static Non-Annuitant Mortality Table for pre-retirement mortality and Published IRS Static Annuitant Mortality Table for post-retirement mortality

5 RP2000 Non-Annuitant Mortality projected to year specified using Scale AA and generation mortality using Scale AA (from 2008 to 2017), or RP2006 Non-Annuitant Mortality projected to year specified using applicable two-dimensional Mortality Improvement Scale and generation mortality using applicable two-dimensional Mortality Improvement Scale (after 2017)

6 RP2000 Annuitant Mortality projected to year specified using Scale AA and generation mortality using Scale AA (from 2008 to 2017), or RP2006 Annuitant Mortality projected to year specified using applicable two-dimensional Mortality Improvement Scale and generation mortality using applicable two-dimensional Mortality Improvement Scale (after 2017)

7 RP2000 Non-Annuitant Mortality projected to year specified using Scale AA for pre-retirement mortality and RP2000 Annuitant Mortality projected to year specified using Scale AA for post-retirement mortality and generation mortality using Scale AA (from 2008 to 2017), or RP2006 Non-Annuitant Mortality projected to year specified using applicable two-dimensional Mortality Improvement Scale for pre-retirement mortality and RP2006 Annuitant Mortality projected to year specified using applicable two-dimensional Mortality Improvement Scale for post-retirement mortality and generation mortality using applicable two-dimensional Mortality Improvement Scale (after 2017)

The seven static tables (male and female non-annuitant mortality, male and female annuitant mortality, male and female combined mortality, and unisex 417(e) applicable mortality) are built on the fly and are not stored as static tables in the ATPBGC database. The codes 0 to 4 above allow for the use of these static tables. The user can create a version of the static tables that is different from the published table by entering a value in the optional DOPT parameter. For example, a version of the 2018 static tables can be created using the pre-2018 rules (RP2000 base mortality table projected with the AA 1- dimensional mortality improvement scale) by populating the optional DOPT parameter with a date that is in a stability period that starts before 2018.

Codes 5 to 7 above are provided to simplify the inputs needed to use the underlying mortality tables and mortality improvement scales that are used to generate the static tables published by the IRS. The user can calculate the same results by entering the appropriate codes into the mortality parameters. For

example, the user can enter 06/01/2018 into the mortality parameters and in the *DOPT* parameter, LCY3 in the Method parameter, 0101 in the plan anniversary parameter and 7 in the *TableInd* parameter or instead can enter:

2D|Table:QB06,ValYear:2018,Scale:MP16,GEN:Y in the male mortality parameter

2D|Table:QD06,ValYear:2018,Scale:FP16,GEN:Y in the female mortality parameter

2D|Table:QA06,ValYear:2018,Scale:MP16,GEN:Y in the male pre-retirement mortality parameter

2D|Table:QC06,ValYear:2018,Scale:FP16,GEN:Y in the female pre-retirement mortality parameter

Functions will return an error if this parameter is populated with a value other than 0, 1, 2, 3, 4, 5, 6, or 7.

DOPT

07/12/2024

This parameter accepts a direct entry of a date value or an Excel range containing a single cell with a date value. This parameter is only applicable when specifying the use of IRS mortality tables. When a date is entered in the mortality parameters and the DOPT parameter is not populated, functions default to use the earlier of 12/31/2017 and the date entered in the mortality parameters. If the code LS06SUYYYY or LS12SUYYYY is entered in the mortality parameter versus a date, the DOPT parameter must be populated with a date (cannot be left blank) that falls in a stability period that starts after 2017. This parameter should only be populated when entering a date in the mortality parameters to obtain a specific IRS mortality table or when entering the code LS06SUYYYY or LS12SUYYYY in the mortality parameters. For the code LS06SUYYYY, the year of the DOPT parameter must be prior to 2024. For the code LS12SUYYYY, the year of the DOPT parameter must be on or after 2024.

An entry in the parameter is required when specifying the use of IRS tables for years after 2017. This is because the 2-dimensional mortality improvement scale changes each year after 2017 (the same 1-dimension mortality improvement scales were used to generate the IRS applicable mortality from 2008 to 2017). The date entered in the DOPT parameter is used to determine the appropriate 2-dimensional mortality improvement scale to use for building the IRS mortality table specified (see TableInd parameter for type of IRS mortality tables that can be specified).

For some plans (e.g., cash balance / statutory hybrid plans, EEC plans, etc.) it is necessary to project the IRS applicable mortality table for a year after DOPT. The projection methodology in effect at DOPT must be used to project the IRS applicable mortality table for future years. Therefore, in a plan that terminates in a stability period that starts in 2018, it is necessary to project the IRS applicable mortality tables for years after 2018 using the 2-dimensional mortality improvement scales used to generate the tables published by the IRS for 2018. For example:

Stability Period: Calendar Year

Plan Anniversary: 01/01

Lookback: 3 months

DOPT: 06/01/2018

XRD: 06/01/2020

Method Parameter: LCY, Mortality Parameters: 06/01/2020, Plan Anniversary Parameter: 0101, DOPT Parameter: 06/01/2018

The 2020 IRS 417(e) applicable mortality will be generated using the underlying mortality tables (RP2006) and 2-dimensional mortality improvement scales (MP16 and FP16) that were used to generate the published 2018 IRS mortality tables.

Note The 2020 mortality table generated in this example will be different from the mortality table ultimately published by the IRS for 2020. Also, if the DOPT parameter had not been populated in this example, the function would default to use a date of 12/31/2017, which would have resulted in generating the 2020 IRS 417(e) applicable mortality using the underlying tables (RP2000) and 1-dimensional mortality improvement scales (AA scales) that were used to generate the published 2017 tables. It is very important to populate the DOPT parameter for plans that terminate in a stability period that starts after 2017 when there is a need to use IRS applicable mortality (even if there is no need to project the mortality for years after DOPT).

Note: The DOPT parameter must be populated when the code LS06SUYYYY or LS12SUYYYY is entered in the mortality parameters. When the DOPT parameter is populated, it is necessary to provide a stability period code and plan anniversary. This is not usually an issue because the IRS mortality tables are usually used with the L interest method, which allows for the stability period codes (e.g., LPY, LCY, LPQ, LCQ, LM, etc.). However, there may be a need to use the O or N interest method with a post-2017 IRS mortality table. Therefore, the N and O interest methods can include a stability period code when a LS06SUYYYY or LS12SUYYYY code is entered in the mortality parameters. This is the only time a stability period can be included with N or O interest methods. In this scenario, it is necessary to enter a valid interest rate structure versus a date in the interest parameter.

PreMMortality and PreFMortality

09/24/2018

These parameters follow the same rules as the *MMortality* and *FMortality* parameters. These are optional parameters that can be populated to specify different pre and post-retirement mortality. The entries in the *MMortality* and *FMortality* parameters are always used for post-retirement mortality. If

these optional parameters are not populated, then the entries in *MMortality* and *FMortality* are used for both pre and post retirement mortality (default). Pre-retirement mortality is only applicable when there is a deferral period. For example, if the valuation age is 55 and the expected retirement age is 65, the mortality specified in these optional parameters is used for the 10-year deferral period (assuming mortality is specified for the deferral period) and then the mortality specifications for *MMortality* and *FMortality* are used for the period following the deferral period. Sometimes plans will specify the basis for actuarial equivalence using different pre and post-retirement mortality. Pre-retirement mortality is the mortality used for the deferral period and post-retirement mortality is the mortality used following the deferral period.

Note These parameters should not be populated when using codes 4 and 7 in the optional TableInd parameter as those codes automatically specify the use of different pre and post-retirement mortality.

ATPBGC Database

04/27/2017

ADMIN_SPARR

04/27/2017

Description: This table contains the SPARR and SPDRR percentage for each year.

Updates: This table is updated annually. The historical SPARR and SPDRR percentages can be found at http://intranet/standards_manuals/manuals/procedures/index.htm#Appendix_H.htm.

ATPBGC_VERSION

12/28/2020

Description: This table contains the version numbers of the add-in implementation files (the dlls, the xlam, and the database). This is used when the add-in is loaded, to ensure that the file versions are synchronized correctly.

Updates: This table is updated each release.

BL_TBL

04/27/2017

Description: This table contains the information from Table I: Selection of Retirement Rate Category from the Actuarial Technical Manual used for determination of the expected retirement age.

Updates: This table is updated annually. The table can be found at http://intranet/standards_manuals/manuals/at/index.htm#VIG5_Table_I_Selection.htm.

CPI

04/27/2017

Description: This table is used only by the deprecated PIA functions (i.e., exists only for older BSRS programs that use the deprecated PIA functions). The table contains the SSA COLA values for each year.

Updates: This table is no longer updated.

EFF_DT

12/28/2020

Description: This table contains an effective date for the LPBGC interest method.

Updates: This table is expected to be updated to include effective dates for other types of information.

ERR_CD

04/27/2017

Description: This table contains short and long descriptions for the error codes generated by the functions in the Add-in.

Updates: This table is updated whenever there is a need to modify the description for an error code or to add a new error code to the table.

FUNC_DTL

04/27/2017

Description: This table contains descriptions for each of the functions in the Add-in and descriptions for each of the parameters for each function in the Add-In.

Updates: This table is updated whenever there is a need to modify the description for a function or parameter or when there is a need to add a new function or parameter to the table.

INT_RATE

04/27/2017

Description: This table contains the PBGC annuity and lump sum interest rates.

Updates: This table is updated monthly. The PBGC annuity interest rates can be found at http://www.pbgc.gov/prac/interest/ida.html and the PBGC lump sum rates can be found at http://www.pbgc.gov/prac/interest/vls.html.

LOOKUP_VAL_TABLE

04/27/2017

Description: This table contains the URL's for the OBA web applications.

Updates: This table is updated whenever there is a need to modify a URL for an OBA web application or add a URL for an OBA web application.

LSRATE

04/27/2017

Description: This table contains the 417(e) applicable interest rates, the 30-year treasury rates, and the interest rates used to convert benefits in plan normal forms of annuity to PBGC optional forms of annuity.

Updates: This table is updated monthly. The 417(e) segment rates can be found at https://www.irs.gov/retirement-plans/minimum-present-value-segment-rates and the 30-year treasury rates can be found at https://www.irs.gov/retirement-plans/weighted-average-interest-rate-table.

MORT_DESC

09/24/2018

Description: This table contains description templates used by the MORTCODE function to return descriptions for different types of IRS mortality tables that can be specified by the user.

Updates: This table is updated whenever there is a need to add additional description templates.

MORT_IMPRVMT_SCALE

04/27/2017

Description: This table contains two-dimensional mortality improvement scales.

Updates: This table is updated whenever there is a need to add a two-dimensional mortality improvement scale.

MORT_IMPRVMT_SCALE_NAME

04/27/2017

Description: This table contains a description and the years included (e.g., the years included in FP14 are 1951 to 2030) for each of the two-dimensional mortality improvement scales contained in the MORT_IMPRVMT_SCALE table.

Updates: This table is updated whenever there is a need to add a two-dimensional mortality improvement scale.

MORT_NAME

04/27/2017

Description: This table contains a description and the base year (e.g., GM83 has a base of 1983) for each of the one-dimensional mortality tables contained in the MORT_TABLE table. The base year is used when a projection is specified (e.g., GM83CU1999 specifies a projection from 1983 to 1999 or a 16 year projection).

Updates: This table is updated whenever there is a need to add a one-dimensional mortality table.

MORT_TABLE

04/27/2017

Description: This table contains one-dimensional mortality tables.

Updates: This table is updated whenever there is a need to add a one-dimensional mortality table.

MTABLENAME

09/24/2018

Description: This table contains the mortality table codes and mortality improvement scale codes for PBGC annuity and lump sum mortality, IRS mortality tables, mortality used for WAM calculations, and mortality used for converting benefits in plan normal forms of annuity to PBGC optional forms of annuity. The mortality improvement scale codes are only applicable for IRS mortality tables.

Updates: This table is updated annually.

NATIONALAVGWAGE

04/27/2017

Description: This table is used only by the deprecated PIA and deprecated salary estimation functions (i.e., exists only for older BSRS programs that use the deprecated PIA and deprecated salary estimation functions). The table contains the SSA national average wage values for each year.

Updates: This table is no longer updated.

PACSRATE

04/27/2017

Description: This table contains the monthly PACS/Spectrum interest rates (100% of Annual Mid-Term Applicable Federal Rate (AFR)).

Updates: This table is updated monthly. The PACS/Spectrum interest rates can be found at http://apps.irs.gov/app/picklist/list/federalRates.html.

PBGC_MORT_DESC

09/24/2018

Description: This table contains description templates used by the MORTCODE function to return descriptions for different types of PBGC lump sum and annuity mortality tables that can be specified by the user.

Updates: This table is updated whenever there is a need to add additional description templates.

PBLSHD_COV_COMP

04/27/2017

Description: This table contains the published covered compensation tables for each year.

Updates: This table is updated annually. The published covered compensation tables can be found at http://intranet/standards_manuals/manuals/at/index.htm#VIIC2_Tables_Covered_Compensation.htm and at https://www.datair.com/rates.htm.

PROJ_SCALE

04/27/2017

Description: This table contains one-dimensional projection scales.

Updates: This table is updated when there is a need to add a one-dimensional projection scale.

PROJ_SCALE_NAME

04/27/2017

Description: This table contains descriptions for each of the one-dimensional projection scales in the PROJ_SCALE table. Updates: This table is updated when there is a need to add a one-dimensional projection scale.

SSA_VAL

04/27/2017

Description: This table contains the SSA COLA, national average wage, and old (1973 ACT) and new law (1977 ACT) wage base values for each year.

Note Because the national average wage value for a particular year is not published until the end of the subsequent year (e.g., the 2015 national average wage is not published until December, 2016), TRMD may at ASD's direction enter an estimated value for a year that has yet to be published. The estimated value will be replaced by the final value once it is published. This change from an estimated value to a final value will cause a change in results from the salary estimation functions and the Social Security functions.

Updates: This table is updated annually. The SSA COLA's can be found at http://www.ssa.gov/OACT/COLA/colaseries.html, the national average wage values can be found at http://www.socialsecurity.gov/OACT/COLA/AWI.html, and the new law wage base values (1977 Act) can be found at https://www.ssa.gov/oact/cola/cbb.html and the old law wage base value can be found at https://www.ssa.gov/oact/cola/oldcbb.html.

TWO_D_MORT_TABLE

04/27/2017

Description: This table contains two-dimensional mortality tables.

Updates: This table is updated whenever there is a need to add a two-dimensional mortality table.

TWO_D_MORT_TABLE_NAME

04/27/2017

Description: This table contains a description and the years included (e.g., the years included in RF002D are 2000 to 2150) for each of the two-dimensional mortality tables contained in the TWO_D_MORT_TABLE table.

Updates: This table is updated whenever there is a need to add a two-dimensional mortality table.

VERSION

04/27/2017

Description: This table contains a record to document each update made to the ATPBGC database. The VERSION function reads this table and returns the last record from the table as part of the output from this troubleshooting function.

Updates: A record is added to this table each time an update is made to the ATPBGC database.

WAGEBASE

04/27/2017

Description: This table is used only by the deprecated PIA and MIL functions (i.e., exists only for older BSRS programs that use the deprecated PIA and MIL functions). The table contains the SSA wage base values (old and new law) for each year.

Updates: This table is no longer updated.

XRA

04/27/2017

Description: This table contains the information from Table II: Expected Retirement Age from the Actuarial Technical Manual used for determination of the expected retirement age.

Updates: This table would be updated only if there was an update to Table II: Expected Retirement Age in the Actuarial Technical Manual. The table can be found at http://intranet/standards_manuals/manuals/at/index.htm#VIG6_Table_II_-_Expected.htm.

Troubleshooting

VERSION

10/30/2017

Format

VERSION()

VERSION (" ")

VERSION ("ALL")

VERSION ("OS")

VERSION ("XLAM")

VERSION ("ATPBGC")

VERSION ("PIA32")

VERSION ("SSADDIN")

VERSION ("DBF")

VERSION ("OS,XLAM"), VERSION ("XLAM,ATPBGC"), VERSION ("XLAM,ATPBGC,DBF"), etc. (any combination of the OS, XLAM, ATPBGC, PIA32, SSAADDIN, and DBF identifiers can be specified).

Return

The version function returns the following for each of the identifiers listed above:

OS: The operating system on the device running Excel, e.g., Windows (32-bit) NT 6.01

Note The function currently returns 32-bit even on devices with a 64-bit operating system.

XLAM: The ATPBGC version number, e.g., xlam: 6.9

ATPBGC: The ATPBGC.dll timestamp, e.g., ATPBGC: 09/08/2017 7:21:54 AM

PIA32: The PIA32.dll timestamp, e.g., PIA32: 09/08/2017 7:22:26 AM

SSAADDIN: The SSAADDIN.dll timestamp, e.g., SSAADDIN: 09/08/2017 7:24:36 AM

DBF: The ATPBGC timestamp and last record from VERSION table, e.g., ACCDB: 04/19/2017 5:46:46 PM Other: Added entries for 2017 in MTABLENAME and made updates for BCV Legacy 1.8 release

(ALL), (""), or (): All of the information listed above for OS, XLAM, ATPBGC, PIA32, SSAADDIN, and DBF

Note The VERSION function always returns the status of the launcher for OBA web applications Spectrum and Image Viewer.

Example

VERSION() returns "Windows (32-bit) NT 6.01 xlam: 6.9 ATPBGC: 09/08/2017 7:21:54 AM PIA32: 09/08/2017 7:22:26 AM SSAADDIN: 09/08/2017 7:24:36 AM ACCDB: 04/19/2017 5:46:46 PM Other: Added entries for 2017 in MTABLENAME and made updates for BCV Legacy 1.8 release"

ERRORCODE

04/27/2017

The ERRORCODE function can be used to obtain a longer description of the error returned.

Format

ERRORCODE(*ErrorNum*)

Return

The long description of the error incurred if available.

Example

=ERRORCODE(2500) **returns** dobYear<1907 or dob>planYear

=ERRORCODE(A2) **returns** dobYear<1907 or dob>planYear', if A2 contains a formula that is returning: "Error #2500"

Parameters

ErrorNum is the error code returned by the function or the cell reference that contains the function returning the error.

REPORT

09/24/2018

The REPORT function can be used to obtain a detailed calculation report as a text file. Detailed calculation reports can be generated for the following functions:

- MAXLIM
- MAXLIMPPA
- SSACALC
- PBGCBFCF2
- PBGCLLF
- SEST_2
- SESTAVG_2
- PBGCBFCFPPA

- HAVG
- HCAVG
- PBGCOFA
- MORTCODE
- XRA2
- BL
- INTCODE
- SERV

Format

REPORT(*CellRef, FileName*)

Return

A detailed report as a text file. The text file is generated in the same directory from which the spreadsheet was opened.

The text file will have the file name specified in the optional *FileName* parameter when specified.

If a file name is not specified, a default file name is generated automatically by the function. The default file name is typically the function name, with “File.txt” appended. For example, the default report file name for the HAVG function is HAVGFile.txt.

The cell containing the REPORT function will show one of the following:

File Successfully Created: the text file with the detailed report was successfully created;

Error Creating File: the text file with the detailed report was not created because there is an error being returned by the function in the cell being referenced;

Report undefined for function name (e.g., NPVF2): the text file with the detailed report was not created because the REPORT function does not support the function in the cell being referenced;

Error - Nested 'INDIRECT' functions are not supported with the Report function: the text file with the detailed report was not created because the INDIRECT function was used in one of the parameters for the function in the cell being referenced.

Example

=REPORT(A1) where the cell A1 contains the MAXLIMPPA function. A detailed report of the calculation performed by the MAXLIMPPA function will be created as a text file in the directory from which the spreadsheet was opened.

Parameters

CellRef is a cell reference that contains the function for which a detailed report is to be generated.

FileName is the user specified filename for the output file generated. This is an optional parameter. The best practice is to use a txt extension. If a file already exists with the same name, it will be overwritten.

Note The function is currently only set up to work for a limited number of functions. The ability to create detailed reports for other functions will be added in future releases.

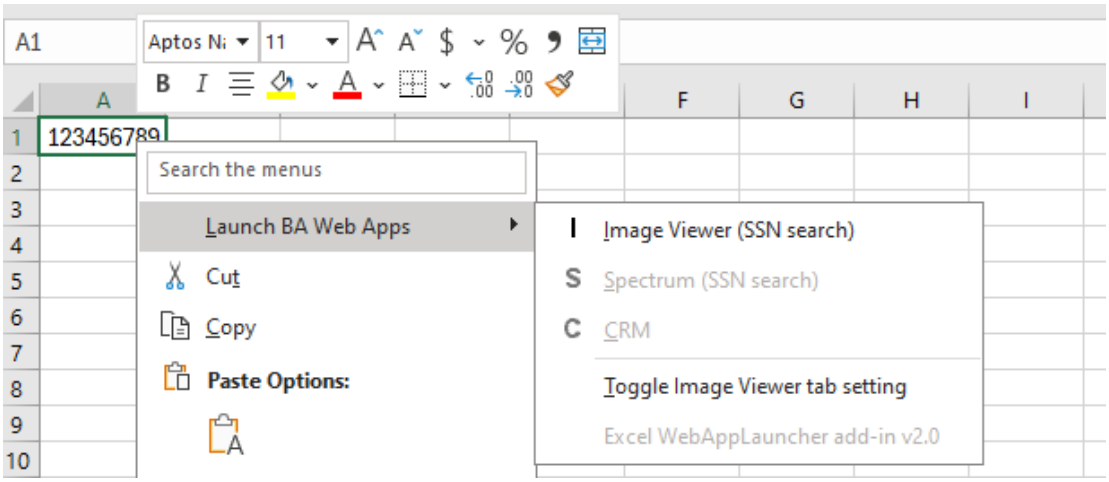
Note The function will return an error in the spreadsheet if the INDIRECT function is used in any of the parameters for the function for which the detailed report is being generated and no detailed report will be generated.

Benefit Administration Web Applications Launcher

02/26/2016

The functionality that was in the separate Excel Add-In called XL_WebAppsLauncher has been added to the ATPBGC Excel Add-In so that only the ATPBGC Excel Add-In needs to be installed and loaded into Excel. This functionality allows a user to launch Spectrum or Image Viewer from Excel using a Social Security Number or PBGC Customer ID entered in the spreadsheet.

To launch Spectrum or Image Viewer using this functionality, right click on a cell containing a Social Security Number or PBGC Customer ID, select “Launch BA Web Apps”, and then select the desired option. Spectrum may only be launched with a PBGC Customer ID. Image Viewer may only be launched with a Social Security Number.



If the benefit administration web application is not open, it will open. If the benefit administration web application is open, the application comes to the top of the desktop. If a record is found with a matching Social Security Number or PBGC Customer ID, the customer’s record will automatically be loaded in the benefit administration web application. If a record cannot be found, the benefit administration web application’s search screen will appear.