# What's New!

ProVal

**ProVal version 2.18** **April 2002**

ProVal version 2.18 introduces several new features including pension payment forms, OPEB payment forms, liability-based efficient frontiers and a tool to calculate individual PIAs. You'll find details about these and other enhancements to ProVal below.

## General

- ProVal's License Server now lets you check out a "commuter" license to operate ProVal for a fixed period of time (up to 30 days) without requiring a hardware key or a network connection (see article on page 12).

## Census Specifications

- In pension modes, you can now set up a Certain & Joint Life benefit for inactives using a single payment form rather than two.
- In OPEB mode, a coded field may now be used to indicate spouse coverage in lieu of a numeric field.

## Benefits (Pension)

- In payment forms, several new options have been added:
  - Life insurance: Deferral option
  - Life insurance: Temporary option
  - Lump sum: Deferral with life contingencies option
  - Lump sum: Deferral without life contingencies option
- Benefit eligibility may now include a selection expression (in addition to age/service/points requirements). For example, you might use "`DIVISION #IN (1,3,5)`" for a death benefit that is only available to certain divisions.
- You can now override the rates used for projected unit credit (PUC) "accrual rate proration" without changing the accrual of benefits. The same is possible for unit credit (UC) "accrual rate proration" (see article on page 3).
- New options for custom PIA operators (i.e., #PIA) let you:
  - Assume that computation age (e.g., SSNRA) is attained at decrement (i.e., use an assumed date of birth) and
  - Project salaries backwards from hire (as opposed to decrement) at a constant rate or following changes in national average wages.

## Benefits (OPEB)

- Two new payment forms let you explicitly value:
  - Reversionary annuity to spouse
  - Life insurance to spouse

  In addition, several new options have been added for existing payment forms:
  - Joint life annuity to spouse: Reversionary extension for n years
  - Life Insurance: Deferral option
  - Life Insurance: Temporary option
- Eligibility for active benefits may now include a selection expression (in addition to age/service/points requirements). For example, you might use "`DIVISION #IN (1,3,5)`" for a death benefit that is only available to certain divisions.

Page

- Eligibility for inactive benefits may now be specified using a selection expression rather than just a coded field.

### Valuation Assumptions

- A new checkbox enables you to zero out pre-retirement mortality for RPA Current Liability and the PBGC Variable Rate Premium Liability. This is a common assumption for small plans.

### Valuations and Core Projections

- The processing message which lists every record with a default applied is now a separate option (so that you view processing messages without this usually voluminous listing).
- Canadian valuations and cores now calculate solvency liability normal cost.
- Individual results now produce average amounts when you run your valuation using grouped data.

### Valuation Set Exhibits

- RPA Current Liability detail (as needed for Form 5500 Schedule B) has been incorporated into valuation set exhibits.
- In the FAS 35 exhibit, inactives in pay status are now accurately distinguished from those in deferral.

### Asset Valuation Methods

- A new option under the "n-year weighted average of asset gains" method lets you base expected return on last year's "market rate" plus the "change in the price of a 30-year bond due to the change in the market rate" plus a premium (for what plan assets are expected to earn over fixed income securities). This option applies to funding assets in U.S. Qualified mode only.
- Under the "weighting of expected actuarial and market values" method, expected return can now be based on either market value or actuarial value. Using an asset base of market value is consistent with the definition of expected assets in Approval 15 of Rev. Proc. 2000-40 with a 1-year averaging period. (Note that ProVal already had the ability to start with market value for the n-year weighted average method.)

### Efficient Frontier

- The efficient frontier can now find asset mixes which optimize excess return (i.e., asset return – liability return), as opposed to optimizing asset-only return (see article on page 7).
- For asset-only efficient frontiers, returns, standard deviations, and correlations can be populated using the following information from a capital market simulation (see article on page 7):
  - Real returns (input)
  - Real returns (simulated) – new!
  - Nominal returns (simulated) – new!
- A new graph provides a "100% bar" asset mix graph illustrating the composition of the asset mixes on the efficient frontier. Also, if an excess return efficient frontier is run, the excess return and asset-only efficient frontiers are compared (see article on page 7).

### Stochastic Forecasts

- A new checkbox in stochastic assumptions lets you reflect the temporary increase in the RPA '94 current liability and PBGC interest rates. That is, for plan years beginning in 2002 or 2003, the maximum RPA rate is changed from 105% to 120% of the weighted average interest rate and the PBGC rate is set to 100%, rather than 85% of the benchmark yield. These changes are pursuant to the Job Creation and Worker Assistance Act of 2002.
- All interest rates (such as the FAS discount rate and funding rate) are now available by trial in a stochastic forecast so they can be used to calculate liability return.

### Tools

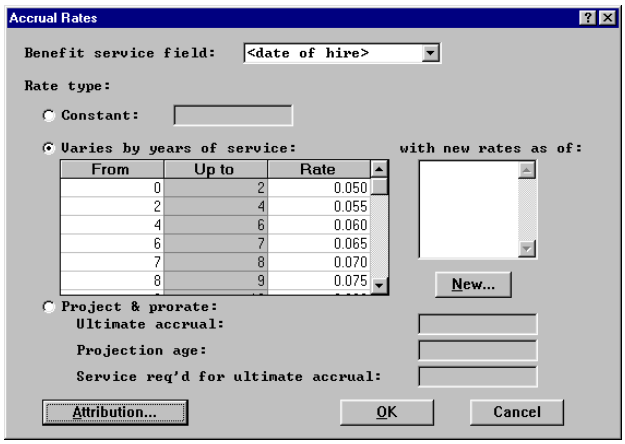
- A new PIA Calculations tool allows you to calculate Social Security Primary Insurance amounts for an individual without having to run a valuation (see article on page 4).
- Pagination in the Nondiscrimination Tests tool has been improved to minimize the number of page breaks, making for a smaller package to send to the IRS.

### Changes Log

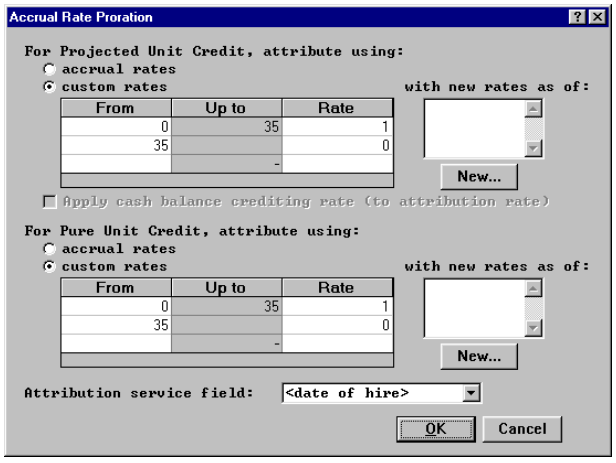
- Be sure to read the changes log (see What's New in Help or the CHANGES.LOG file in the ProVal directory) about updates to certain calculations that change results.

# Attribution

Accrual rate proration (for Projected and Pure Unit Credit methods) can now be explicitly controlled for each accrual definition component in a benefit formula. This is done by specifying separate accrual and attribution rates on the rates screen. For example, the component shown below has a "back loaded" accrual which increases from 5% to 30% over 35 years (0% thereafter).




To attribute this linearly over 35 years, press the **Attribution…** button and enter separate rates for PUC (and possibly UC, see below for an explanation). These separate attribution rates are then used to attribute this component for Benefit Definitions using accrual rate proration.




### Projected Unit Credit

Without the separate attribution rates, accrual rate proration will attribute the benefit formula component (BFT) using the accumulated accrual rates (RATES). Thus,

pucBFT[*r*] = BFT[*r*] * (RATES[*x*] / RATES[*r*])

where *x* is age at beginning of the year (or end of the year) and *r* is age at decrement. Substituting the separate attribution rates for PUC, this becomes:

pucBFT[*r*] = BFT[*r*] *
(pucRATES[*x*] / pucRATES[*r*])

For a cash balance component, the pucRATES[*x*] and pucRATES[*r*] may include interest credits to decrement age *r* at your option.

### Unit Credit

Separate attribution rates are not generally needed for unit credit. Without them, the accrual rate proration will yield:

ucBFT[*r*] = BFT[*x*]

and for cash balance components will include interest to decrement age *r*.

However, if you (1) have separate attribution rates for PUC and (2) want UC to equal PUC without projected salary (i.e., BASIS), then you'll want to specify the same attribution rates for UC. The modified formula becomes:

ucBFT[*r*] = BFT[*x*] *
(ucRATES[*x*] / ucRATES[*r*]) /
(RATES[*x*] / RATES[*r*])

To see how this works, consider a final average component. We know that BFT[*age*] = RATES[*age*] * BASIS[*age*], so this reduces to:

ucBFT[*r*] = (RATES[*x*] * BASIS[*x*]) *
(ucRATES[*x*] / ucRATES[*r*]) /
(RATES[*x*] / RATES[*r*])

= (RATES[*r*] * BASIS[*x*]) *
(ucRATES[*x*] / ucRATES[*r*])

and the PUC formula above reduces to:

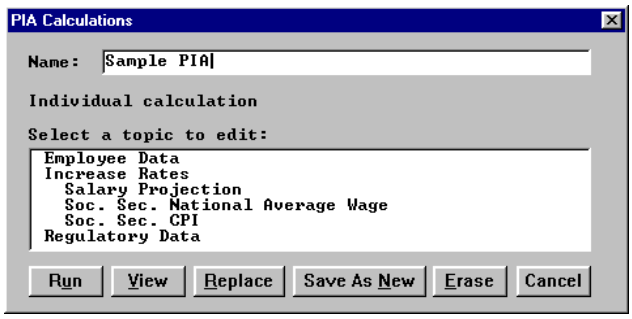
pucBFT[*r*] =BFT[*r*] *
(pucRATES[*x*] / pucRATES[*r*])

= (RATES[*r*] * BASIS[*r*]) *
(pucRATES[*x*] / pucRATES[*r*])

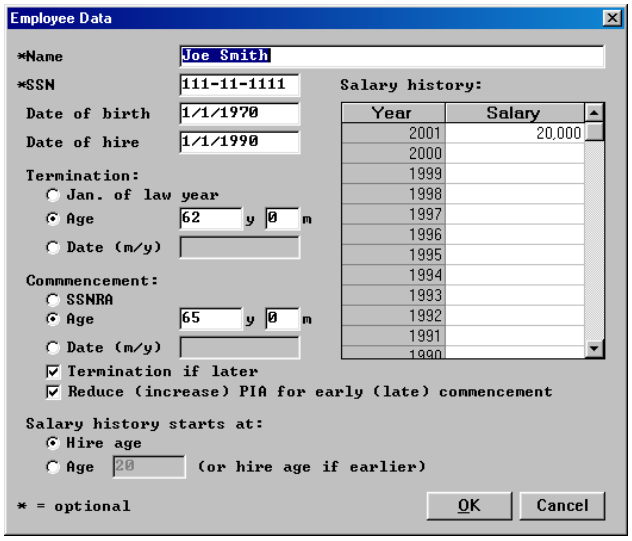
Comparing the two formulas, we see that UC uses BASIS[*x*] and PUC uses BASIS[*r*]. That is, they are the same except for the BASIS projection, which is what we wanted.

# PIA Calculations Tool

ProVal's new PIA Tool lets you calculate a PIA for a single individual without having to specify the required information in a database and run a valuation with individual results. To calculate a PIA, choose **PIA Calculations** from the **Tools** menu. Each of the PIA Calculation topics is discussed below.




## Employee Data




The Employee Data topic is where you specify the individual's known demographic information.

The date of **termination** determines when salary, national average wage, and CPI increases stop applying (see discussion of increase rates below for more detail).

The number of months between the date of **commencement** and full retirement determines the number of months of reduction or credit (see discussion of output below for more detail). In addition, the last year of salary and CPI will be the year prior to commencement.

The salary history must at least contain the most recent year's salary. Not all salaries in the salary history need to be provided. However, there may not be any blank imbedded values amongst the years that are provided. All years prior to the last provided year will be filled in with salary scale. The salary history automatically spans the years beginning with the start age (not earlier than 1951) and ending with the law year (or, if earlier, the year of termination or commencement).

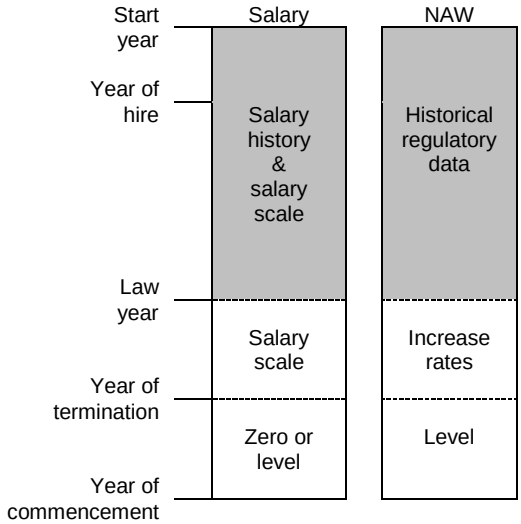
## Increase Rates

Increase rates, as shown in the following diagram, are used to project

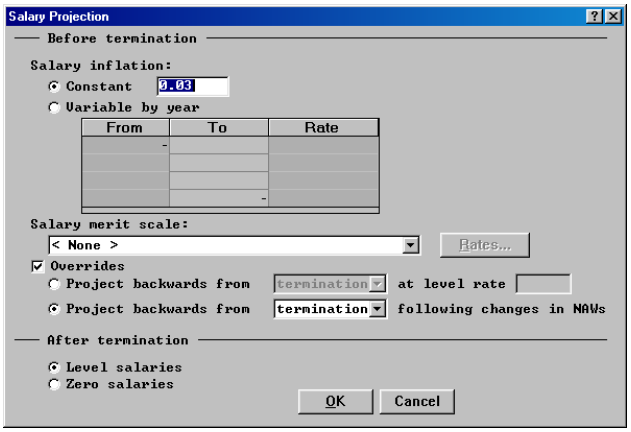
- Salaries,
- Soc. Sec. National Average Wages (NAW), and
- Soc. Sec. CPI

from the law year to the year of termination. Salary increase rates (i.e., salary scale) are also used to project salaries backwards before the law year if not specified in the salary history.

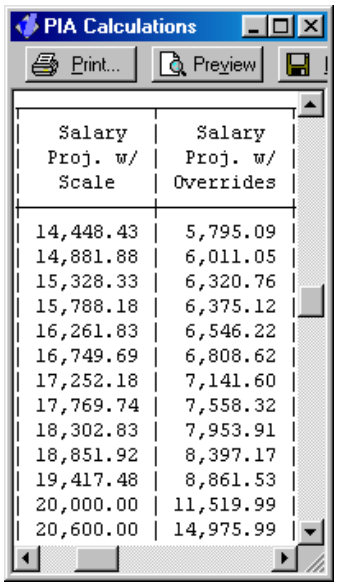
**Increase Rates Timeline**



## Salary Projection



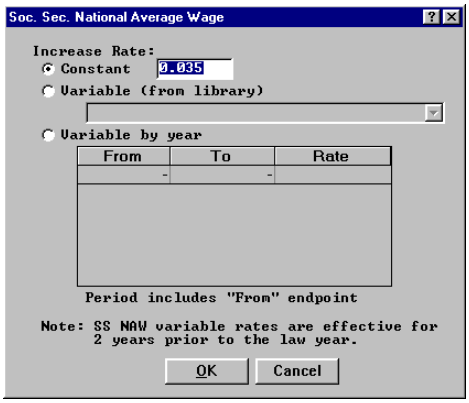

Salary scale (i.e., salary inflation and merit) is applied to salary history to produce the "Salary Proj. w/ Scale" column shown at right. These projected salaries are then overridden after termination with level or zero salaries (and an optional override before termination) to produce the "Salary Proj. w/ Overrides" column shown at right.




| Salary Proj. w/ Scale | Salary Proj. w/ Overrides |
|---|---|
| 14,448.43 | 5,795.09 |
| 14,881.88 | 6,011.05 |
| 15,328.33 | 6,320.76 |
| 15,788.18 | 6,375.12 |
| 16,261.83 | 6,546.22 |
| 16,749.69 | 6,808.62 |
| 17,252.18 | 7,141.60 |
| 17,769.74 | 7,558.32 |
| 18,302.83 | 7,953.91 |
| 18,851.92 | 8,397.17 |
| 19,417.48 | 8,861.53 |
| 20,000.00 | 11,519.99 |
| 20,600.00 | 14,975.99 |

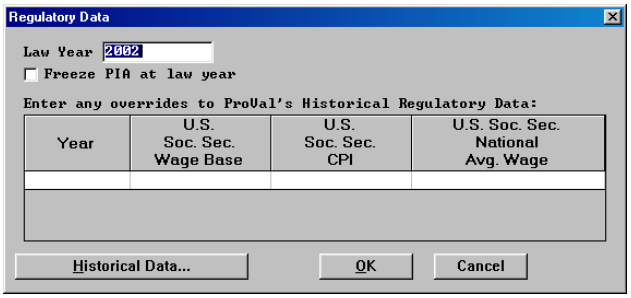
Only full years of salary are considered. This specifically applies to the salary in the year of hire (even if provided in the salary history). Further, salaries are only considered through the later of termination or the year prior to commencement, whichever comes first.

## NAW & CPI Increase Rates




The NAW and CPI increase rates apply from the law year through termination. From termination to commencement, 0% increase (i.e., level projection) is assumed. The national average wage assumption (NAW) also applies to the social security wage base.

## Regulatory Data

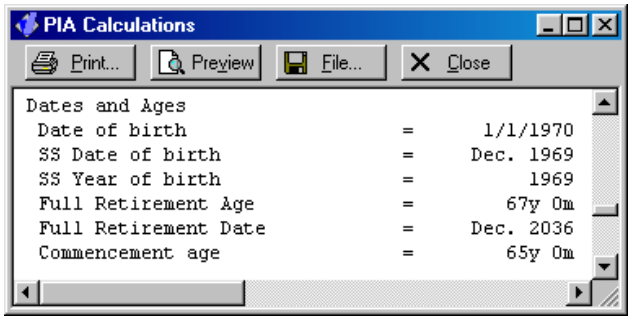



The Regulatory Data topic is very similar to the Regulatory Data topic in Valuation Assumptions. It allows you to override any historical values and specify the Law Year for the calculation.

The **Law year**, even if in the future, determines where history stops and assumptions (salaries, wage bases, national average wages, and CPI) begin. That is, historical regulatory data will be used up to the law year and increase rate assumptions will apply from the law year to termination.

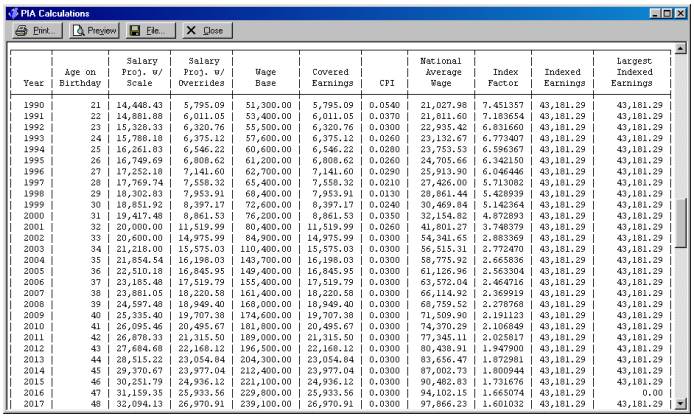
The **Freeze PIA at law year** checkbox freezes the salaries, national average wage, CPI, etc. in effect as of that year.

## Output

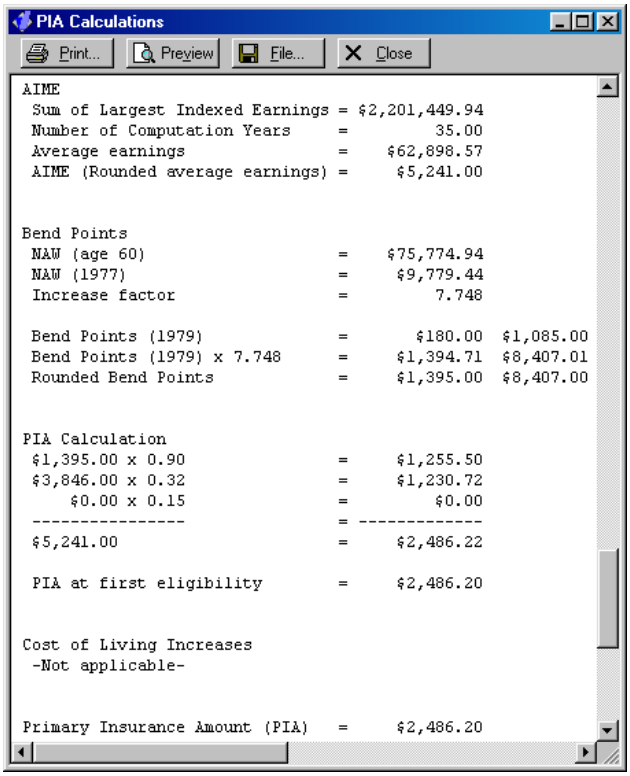



First, dates and ages are calculated pursuant to the social security law and regulations.

- **Date of birth** is the actual date of birth as entered.
- **SS date of birth** is the day preceding the actual date of birth. This date is described as a month and year, e.g., Dec. 1969. See CFR 404.2(c)(4).
- **SS year of birth** follows directly from the SS Date of birth.
- **Full retirement age** is determined from the SS year of birth. In general, it is age 65 for SS year of birth prior to 1938, grading up to age 67 for SS year of birth after 1959. See Soc. Sec. Act §216(l)(1).
- **Full retirement date** is the month and year in which full retirement age is attained. It is determined by adding the full retirement age to the SS date of birth.
- The number of months between the **commencement age** and **full retirement age** will determine the amount of any reduction or credit.




| Year | Age on Birthday | Salary Proj. w/ Scale | Salary Proj. w/ Overrides | Wage Base | Covered Earnings | CPI | National Average Wage | Index Factor | Indexed Earnings | Largest Indexed Earnings |
|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | 21 | 14,448.43 | 5,795.09 | 51,300.00 | 5,795.09 | 0.0540 | 21,027.98 | 7.451357 | 43,181.29 | 43,181.29 |
| 1991 | 22 | 14,881.88 | 6,011.05 | 53,400.00 | 6,011.05 | 0.0370 | 21,811.60 | 7.183654 | 43,181.29 | 43,181.29 |
| 1992 | 23 | 15,328.33 | 6,320.76 | 55,500.00 | 6,320.76 | 0.0300 | 22,935.42 | 6.831660 | 43,181.29 | 43,181.29 |
| 1993 | 24 | 15,788.18 | 6,375.12 | 57,600.00 | 6,375.12 | 0.0260 | 23,132.67 | 6.773407 | 43,181.29 | 43,181.29 |
| 1994 | 25 | 16,261.83 | 6,546.22 | 60,600.00 | 6,546.22 | 0.0280 | 23,753.53 | 6.596367 | 43,181.29 | 43,181.29 |
| 1995 | 26 | 16,749.69 | 6,808.62 | 61,200.00 | 6,808.62 | 0.0260 | 24,705.66 | 6.342150 | 43,181.29 | 43,181.29 |
| 1996 | 27 | 17,252.18 | 7,141.60 | 62,700.00 | 7,141.60 | 0.0290 | 25,913.90 | 6.046446 | 43,181.29 | 43,181.29 |
| 1997 | 28 | 17,769.74 | 7,558.32 | 65,400.00 | 7,558.32 | 0.0210 | 27,426.00 | 5.713082 | 43,181.29 | 43,181.29 |
| 1998 | 29 | 18,302.83 | 7,953.91 | 68,400.00 | 7,953.91 | 0.0130 | 28,861.44 | 5.428939 | 43,181.29 | 43,181.29 |
| 1999 | 30 | 18,851.92 | 8,397.17 | 72,600.00 | 8,397.17 | 0.0240 | 30,469.84 | 5.142364 | 43,181.29 | 43,181.29 |
| 2000 | 31 | 19,417.48 | 8,861.53 | 76,200.00 | 8,861.53 | 0.0350 | 32,154.82 | 4.872893 | 43,181.29 | 43,181.29 |
| 2001 | 32 | 20,000.00 | 11,519.99 | 80,400.00 | 11,519.99 | 0.0260 | 41,801.27 | 3.748379 | 43,181.29 | 43,181.29 |
| 2002 | 33 | 20,600.00 | 14,975.99 | 84,900.00 | 14,975.99 | 0.0300 | 54,341.65 | 2.883369 | 43,181.29 | 43,181.29 |
| 2003 | 34 | 21,218.00 | 15,575.03 | 110,400.00 | 15,575.03 | 0.0300 | 56,515.31 | 2.772470 | 43,181.29 | 43,181.29 |
| 2004 | 35 | 21,854.54 | 16,198.03 | 143,700.00 | 16,198.03 | 0.0300 | 58,775.92 | 2.665836 | 43,181.29 | 43,181.29 |
| 2005 | 36 | 22,510.18 | 16,845.95 | 149,400.00 | 16,845.95 | 0.0300 | 61,126.96 | 2.563304 | 43,181.29 | 43,181.29 |
| 2006 | 37 | 23,185.48 | 17,519.79 | 155,400.00 | 17,519.79 | 0.0300 | 63,572.04 | 2.464716 | 43,181.29 | 43,181.29 |
| 2007 | 38 | 23,881.05 | 18,220.58 | 161,400.00 | 18,220.58 | 0.0300 | 66,114.92 | 2.369919 | 43,181.29 | 43,181.29 |
| 2008 | 39 | 24,597.48 | 18,949.40 | 168,000.00 | 18,949.40 | 0.0300 | 68,759.52 | 2.278768 | 43,181.29 | 43,181.29 |
| 2009 | 40 | 25,335.40 | 19,707.38 | 174,600.00 | 19,707.38 | 0.0300 | 71,509.90 | 2.191123 | 43,181.29 | 43,181.29 |
| 2010 | 41 | 26,095.46 | 20,495.67 | 181,800.00 | 20,495.67 | 0.0300 | 74,370.29 | 2.106849 | 43,181.29 | 43,181.29 |
| 2011 | 42 | 26,878.33 | 21,315.50 | 189,000.00 | 21,315.50 | 0.0300 | 77,345.11 | 2.025817 | 43,181.29 | 43,181.29 |
| 2012 | 43 | 27,684.68 | 22,168.12 | 196,500.00 | 22,168.12 | 0.0300 | 80,438.91 | 1.947900 | 43,181.29 | 43,181.29 |
| 2013 | 44 | 28,515.22 | 23,054.84 | 204,300.00 | 23,054.84 | 0.0300 | 83,656.47 | 1.872981 | 43,181.29 | 43,181.29 |
| 2014 | 45 | 29,370.67 | 23,977.04 | 212,400.00 | 23,977.04 | 0.0300 | 87,002.73 | 1.800944 | 43,181.29 | 43,181.29 |
| 2015 | 46 | 30,251.79 | 24,936.12 | 221,100.00 | 24,936.12 | 0.0300 | 90,482.83 | 1.731676 | 43,181.29 | 43,181.29 |
| 2016 | 47 | 31,159.35 | 25,933.56 | 229,800.00 | 25,933.56 | 0.0300 | 94,102.15 | 1.665074 | 43,181.29 | 0.00 |
| 2017 | 48 | 32,094.13 | 26,970.91 | 239,100.00 | 26,970.91 | 0.0300 | 97,866.23 | 1.601032 | 43,181.29 | 43,181.29 |

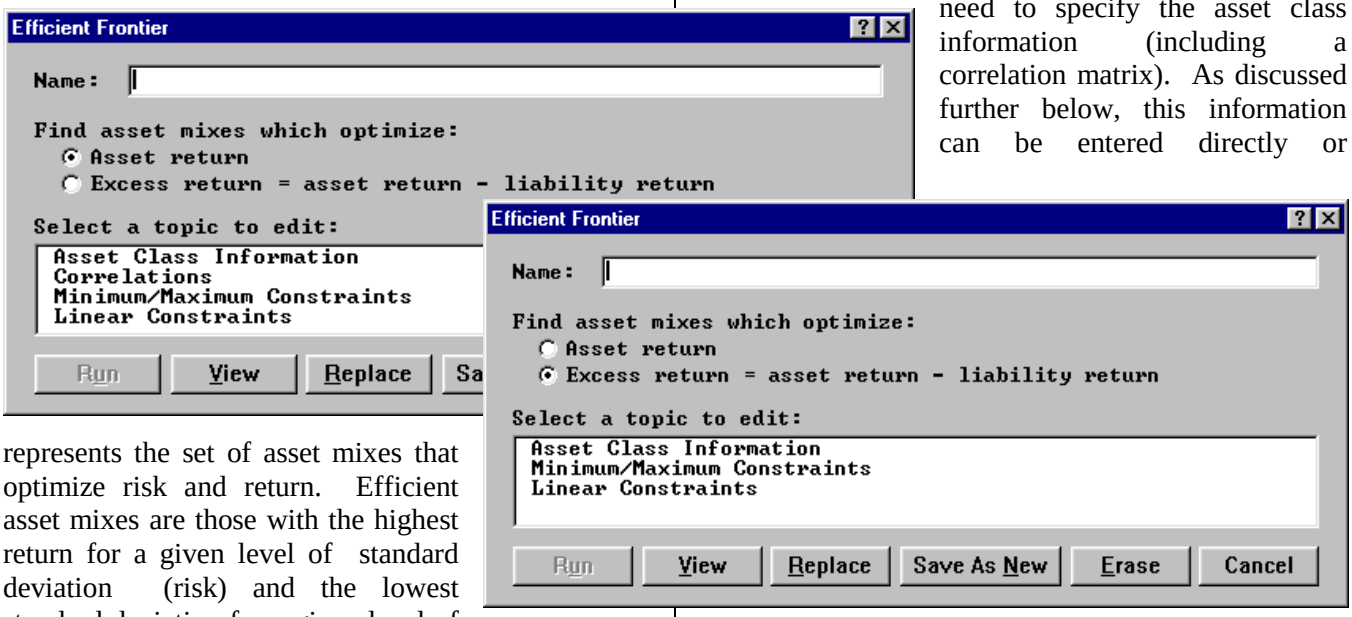



Finally, the steps of the calculation are shown, including all intermediate rounding. These steps include the development of the AIME, PIA, and any adjustments such as CPI, reductions, or (delayed retirement) credits.

# Efficient Frontiers

Determination of the efficient frontier is an important step in any asset allocation analysis. The purpose of the efficient frontier is to narrow down the universe of asset mixes to be considered for asset liability modeling. In the past, ProVal's efficient frontier could only be calculated based on expected asset returns and standard deviations which, in turn, could be populated from a mean-variance Capital Market Simulation. ProVal's version 2.18 adds new options to (1) calculate and display efficient frontiers more effectively (including enhanced graphic output) and (2) optionally reflect plan liabilities in the efficient frontier calculation.

The basic premise of an efficient frontier is that it represents the set of asset mixes that optimize risk and return. Efficient asset mixes are those with the highest return for a given level of standard deviation (risk) and the lowest standard deviation for a given level of return. The return (and associated standard deviation) used for the calculation can be either real (i.e., net of inflation) returns, or nominal returns.




The most significant efficient frontier enhancement added to ProVal in version 2.18 is the ability to optimize "excess return" rather than solely asset return. In this context, excess return is defined as the excess of the asset return over the liability return, and the liability return can be calculated based on whichever liability (PBO, ABO, current liability, solvency liability, etc.) seems most appropriate given the plan sponsor's objectives. (See the box at the end of this article for the details of the liability return calculation.)

Generally, excess return efficient frontiers produce better asset allocation options if:

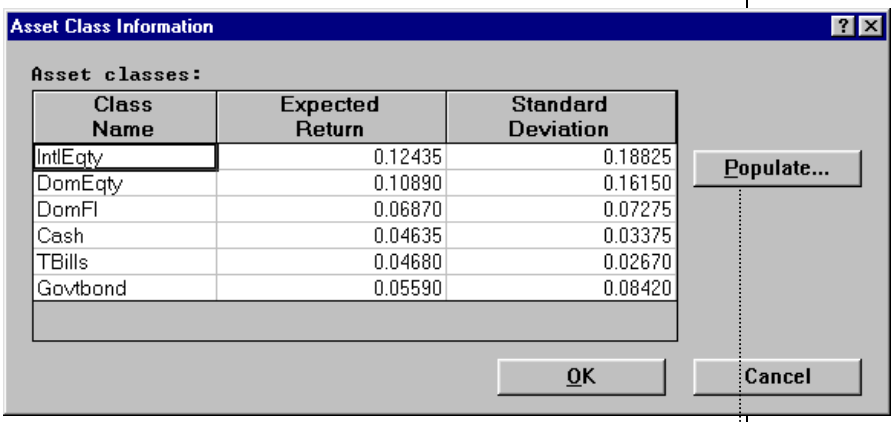
- the plan sponsor's idea of risk is related to surplus, contributions, or expense,
- the associated liability moves with interest rates, and
- the asset classes include options that would effect the duration of the investments.

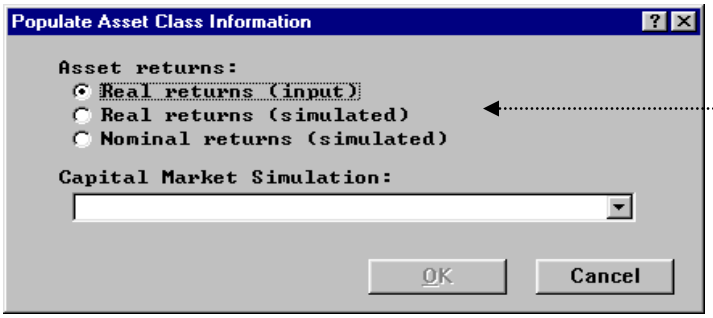
To develop efficient frontiers, choose **Efficient Frontier** from the **Input** menu. Your first choice will be whether to optimize asset return or excess return. Depending on your selection, the topics to edit will change. At a minimum, you will always need to specify the asset class information (including a correlation matrix). As discussed further below, this information can be entered directly or "populated" from ProVal entities that you have already created.

Once your asset class data has been defined you may choose to enter asset mix constraints which can take the form of minimum/maximum constraints and/or linear constraints (e.g., all of my equity classes can't exceed more than 80% of the portfolio). ProVal version 2.18 does not make any changes with respect to constraints, so they are not discussed further in this article.

## Asset Class Information: Populate Asset Returns

Asset class information is entered quite differently depending on whether you are optimizing asset return or excess return. When optimizing asset return, the **Asset Class Name**, **Expected Return, Standard Deviation,** and **Correlations** may be entered on the screen directly or, preferably, by using the **Populate** feature.



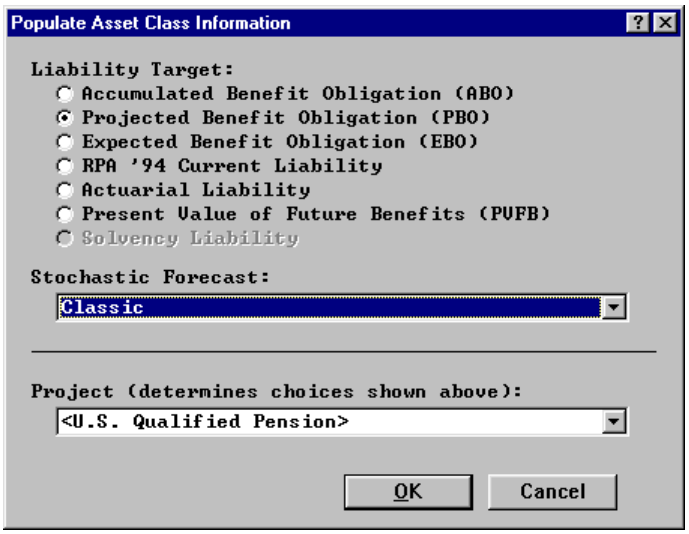

The newly expanded Populate feature allows you to reference any of the following Capital Market Simulation data:

1) **Real returns (input)**, which refers to inputs of the classic mean-variance simulator. This was the only type of populate previously permitted.
2) **Real returns (simulated)**, or
3) **Nominal returns (simulated)**. The simulated real or nominal returns can come from any type of capital market simulation (classic mean/variance, multi-factor or imported).

## Asset Class Information: Populate Excess Returns

You do not have an option to enter information directly when optimizing excess return. Rather, the Asset Class Information is determined automatically based on the **Liability Target** and **Stochastic Forecast** that you select. The available liability targets vary by the stochastic forecast parameters and the calculation mode. The liability target can be either an accounting liability (ABO, PBO or EBO) or a funding liability (Current Liability, Actuarial Liability, Present Value of Future Benefits or Canadian Solvency Liability).

When you push the **OK** button after selecting a liability target and a stochastic forecast, ProVal will re-run the stochastic forecast to calculate the necessary asset class information inputs for the efficient frontier. These inputs are not displayed at this time but passed automatically and saved (and available for inspection with the rest of the inputs and results by pushing the **View** button).

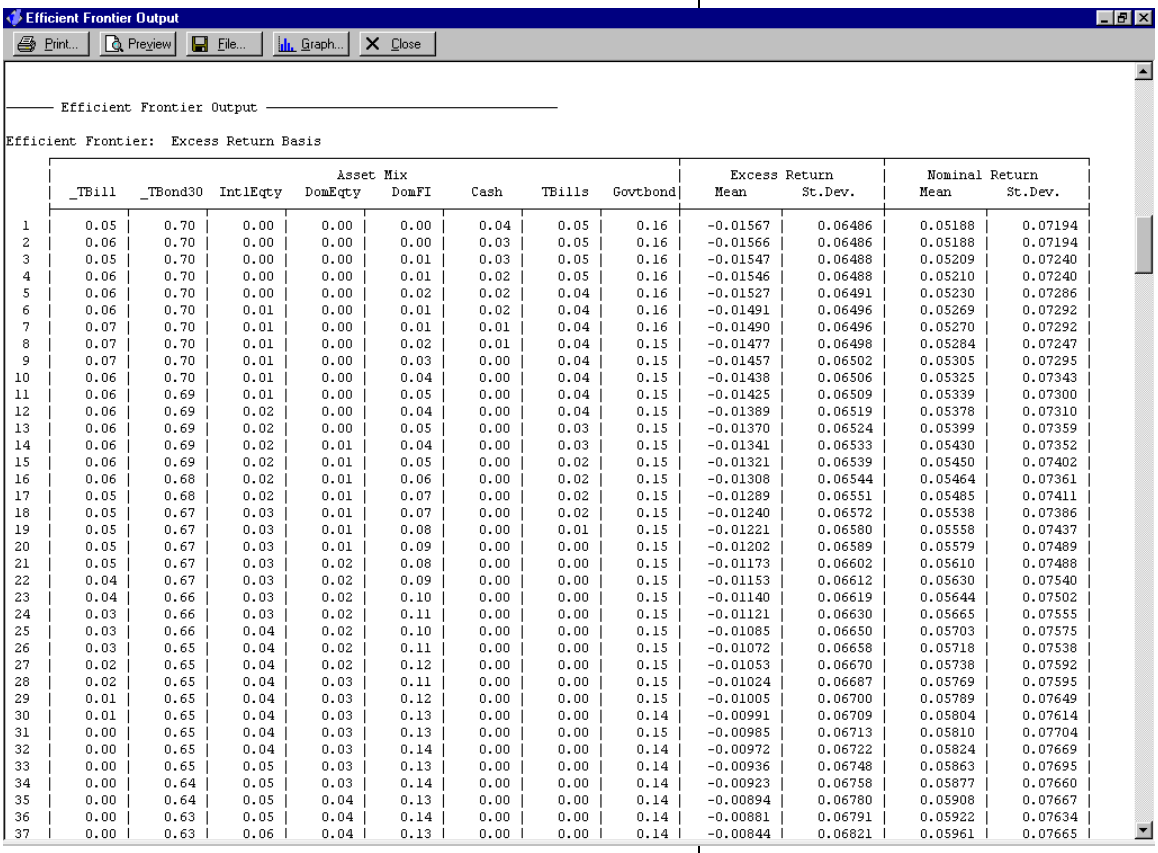


**How are the Excess Returns Calculated?**

Excess returns are defined as the excess of the asset class return over the liability return. Asset class returns are well defined, but can be represented as $1+ {}_A r_n = \frac{A_{n+1}}{A_n + k_n}$. Liability return is defined comparably to asset return as follows: $1+ {}_L r_n = \frac{L_{n+1}}{L_n + k_n}$ . In these equations, $k_n$ is the cash flow, defined, for purposed of the liability return, as the excess of the liabilities' normal cost over benefit payments. ProVal calculates the excess return for each asset class for each year and trial, and then determines the empirical mean, standard deviation and correlations for input into the efficient frontier. Thus, the excess return reflects the actual particularities of the plan over the referenced time period, not a generic assumption about liability duration.

### Tabular Output

You can examine the efficient frontier in tabular and graphic form by pushing the **View** button. The tabular efficient frontier output has not changed for an asset-only efficient frontier. The excess return efficient frontier produces comparable, but more data than the asset-only efficient frontier as shown above. In both cases, after a summary of the inputs, a table is provided with the asset mix percentages and the efficient frontier mean return and standard deviation.




Efficient Frontier Output

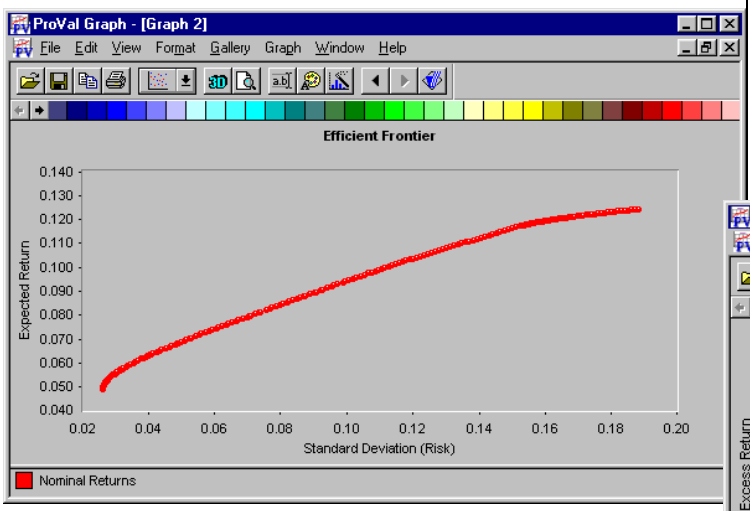
Efficient Frontier: Excess Return Basis

| | Asset Mix | | | | | | | | Excess Return | | Nominal Return | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | _TBill | _TBond30 | IntlEqty | DomEqty | DomFI | Cash | TBills | Govtbond | Mean | St.Dev. | Mean | St.Dev. |
| 1 | 0.05 | 0.70 | 0.00 | 0.00 | 0.00 | 0.04 | 0.05 | 0.16 | -0.01567 | 0.06486 | 0.05188 | 0.07194 |
| 2 | 0.06 | 0.70 | 0.00 | 0.00 | 0.00 | 0.03 | 0.05 | 0.16 | -0.01566 | 0.06486 | 0.05188 | 0.07194 |
| 3 | 0.05 | 0.70 | 0.00 | 0.00 | 0.01 | 0.03 | 0.05 | 0.16 | -0.01547 | 0.06488 | 0.05209 | 0.07240 |
| 4 | 0.06 | 0.70 | 0.00 | 0.00 | 0.01 | 0.02 | 0.05 | 0.16 | -0.01546 | 0.06488 | 0.05210 | 0.07240 |
| 5 | 0.06 | 0.70 | 0.00 | 0.00 | 0.02 | 0.02 | 0.04 | 0.16 | -0.01527 | 0.06491 | 0.05230 | 0.07286 |
| 6 | 0.06 | 0.70 | 0.01 | 0.00 | 0.01 | 0.02 | 0.04 | 0.16 | -0.01491 | 0.06496 | 0.05269 | 0.07292 |
| 7 | 0.07 | 0.70 | 0.01 | 0.00 | 0.01 | 0.01 | 0.04 | 0.16 | -0.01490 | 0.06496 | 0.05270 | 0.07292 |
| 8 | 0.07 | 0.70 | 0.01 | 0.00 | 0.02 | 0.01 | 0.04 | 0.15 | -0.01477 | 0.06498 | 0.05284 | 0.07247 |
| 9 | 0.07 | 0.70 | 0.01 | 0.00 | 0.03 | 0.00 | 0.04 | 0.15 | -0.01457 | 0.06502 | 0.05305 | 0.07295 |
| 10 | 0.06 | 0.70 | 0.01 | 0.00 | 0.04 | 0.00 | 0.04 | 0.15 | -0.01438 | 0.06506 | 0.05325 | 0.07343 |
| 11 | 0.06 | 0.69 | 0.01 | 0.00 | 0.05 | 0.00 | 0.04 | 0.15 | -0.01425 | 0.06509 | 0.05339 | 0.07300 |
| 12 | 0.06 | 0.69 | 0.02 | 0.00 | 0.04 | 0.00 | 0.04 | 0.15 | -0.01389 | 0.06519 | 0.05378 | 0.07310 |
| 13 | 0.06 | 0.69 | 0.02 | 0.00 | 0.05 | 0.00 | 0.03 | 0.15 | -0.01370 | 0.06524 | 0.05399 | 0.07359 |
| 14 | 0.06 | 0.69 | 0.02 | 0.01 | 0.04 | 0.00 | 0.03 | 0.15 | -0.01341 | 0.06533 | 0.05430 | 0.07352 |
| 15 | 0.06 | 0.69 | 0.02 | 0.01 | 0.05 | 0.00 | 0.02 | 0.15 | -0.01321 | 0.06539 | 0.05450 | 0.07402 |
| 16 | 0.06 | 0.68 | 0.02 | 0.01 | 0.06 | 0.00 | 0.02 | 0.15 | -0.01308 | 0.06544 | 0.05464 | 0.07361 |
| 17 | 0.05 | 0.68 | 0.02 | 0.01 | 0.07 | 0.00 | 0.02 | 0.15 | -0.01289 | 0.06551 | 0.05485 | 0.07411 |
| 18 | 0.05 | 0.67 | 0.03 | 0.01 | 0.07 | 0.00 | 0.02 | 0.15 | -0.01240 | 0.06572 | 0.05538 | 0.07386 |
| 19 | 0.05 | 0.67 | 0.03 | 0.01 | 0.08 | 0.00 | 0.01 | 0.15 | -0.01221 | 0.06580 | 0.05558 | 0.07437 |
| 20 | 0.05 | 0.67 | 0.03 | 0.01 | 0.09 | 0.00 | 0.00 | 0.15 | -0.01202 | 0.06589 | 0.05579 | 0.07489 |
| 21 | 0.05 | 0.67 | 0.03 | 0.02 | 0.08 | 0.00 | 0.00 | 0.15 | -0.01173 | 0.06602 | 0.05610 | 0.07488 |
| 22 | 0.04 | 0.67 | 0.03 | 0.02 | 0.09 | 0.00 | 0.00 | 0.15 | -0.01153 | 0.06612 | 0.05630 | 0.07540 |
| 23 | 0.04 | 0.66 | 0.03 | 0.02 | 0.10 | 0.00 | 0.00 | 0.15 | -0.01140 | 0.06619 | 0.05644 | 0.07502 |
| 24 | 0.03 | 0.66 | 0.03 | 0.02 | 0.11 | 0.00 | 0.00 | 0.15 | -0.01121 | 0.06630 | 0.05665 | 0.07555 |
| 25 | 0.03 | 0.66 | 0.04 | 0.02 | 0.10 | 0.00 | 0.00 | 0.15 | -0.01085 | 0.06650 | 0.05703 | 0.07575 |
| 26 | 0.03 | 0.65 | 0.04 | 0.02 | 0.11 | 0.00 | 0.00 | 0.15 | -0.01072 | 0.06658 | 0.05718 | 0.07538 |
| 27 | 0.02 | 0.65 | 0.04 | 0.02 | 0.12 | 0.00 | 0.00 | 0.15 | -0.01053 | 0.06670 | 0.05738 | 0.07592 |
| 28 | 0.02 | 0.65 | 0.04 | 0.03 | 0.11 | 0.00 | 0.00 | 0.15 | -0.01024 | 0.06687 | 0.05769 | 0.07595 |
| 29 | 0.01 | 0.65 | 0.04 | 0.03 | 0.12 | 0.00 | 0.00 | 0.15 | -0.01005 | 0.06700 | 0.05789 | 0.07649 |
| 30 | 0.01 | 0.65 | 0.04 | 0.03 | 0.13 | 0.00 | 0.00 | 0.14 | -0.00991 | 0.06709 | 0.05804 | 0.07614 |
| 31 | 0.00 | 0.65 | 0.04 | 0.03 | 0.13 | 0.00 | 0.00 | 0.15 | -0.00985 | 0.06713 | 0.05810 | 0.07704 |
| 32 | 0.00 | 0.65 | 0.04 | 0.03 | 0.14 | 0.00 | 0.00 | 0.14 | -0.00972 | 0.06722 | 0.05824 | 0.07669 |
| 33 | 0.00 | 0.65 | 0.05 | 0.03 | 0.13 | 0.00 | 0.00 | 0.14 | -0.00936 | 0.06748 | 0.05863 | 0.07695 |
| 34 | 0.00 | 0.64 | 0.05 | 0.03 | 0.14 | 0.00 | 0.00 | 0.14 | -0.00923 | 0.06758 | 0.05877 | 0.07660 |
| 35 | 0.00 | 0.64 | 0.05 | 0.04 | 0.13 | 0.00 | 0.00 | 0.14 | -0.00894 | 0.06780 | 0.05908 | 0.07667 |
| 36 | 0.00 | 0.63 | 0.05 | 0.04 | 0.14 | 0.00 | 0.00 | 0.14 | -0.00881 | 0.06791 | 0.05922 | 0.07634 |
| 37 | 0.00 | 0.63 | 0.06 | 0.04 | 0.13 | 0.00 | 0.00 | 0.14 | -0.00844 | 0.06821 | 0.05961 | 0.07665 |

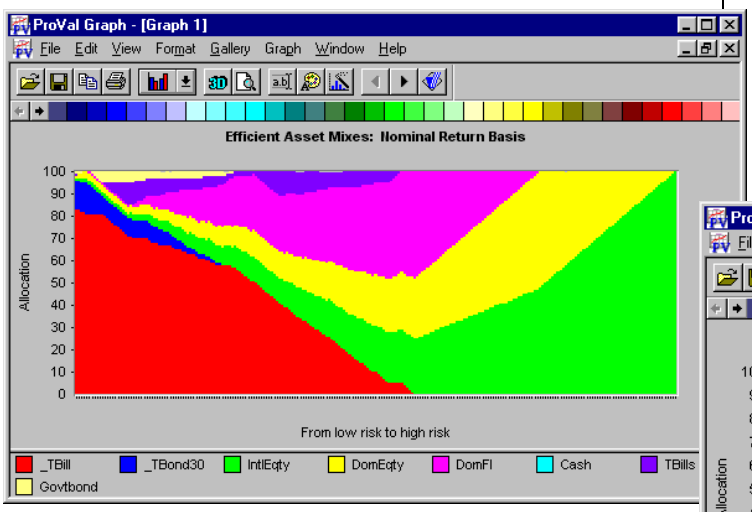
For the excess return efficient frontier, two separate efficient frontiers are calculated and displayed. The first table is the results of the excess return efficient frontier with an additional set of information: the asset-only mean return and standard deviation associated with the excess return efficient portfolios. The second table is the results of the asset-only efficient frontier, again with an additional set of information: the excess return and standard deviation associated with the asset-only efficient portfolios. This information is calculated and provided so that the efficient frontier can be viewed and compared on "apples-to-apples" bases including the familiar asset-only expected return and standard deviation basis.

## Graphs

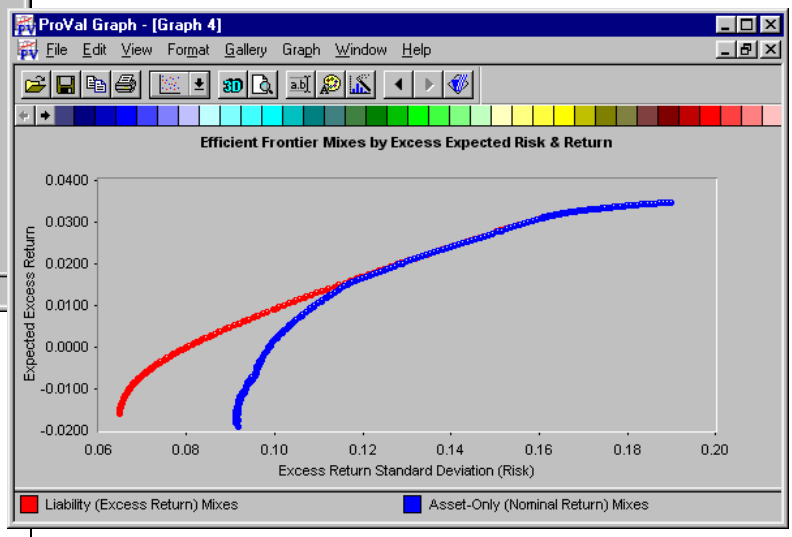
When you graph the output, Version 2.18 will produce the classic efficient frontier graph that was always available as well as a new graph illustrating the percentage of each asset class in each mix on the efficient frontier.



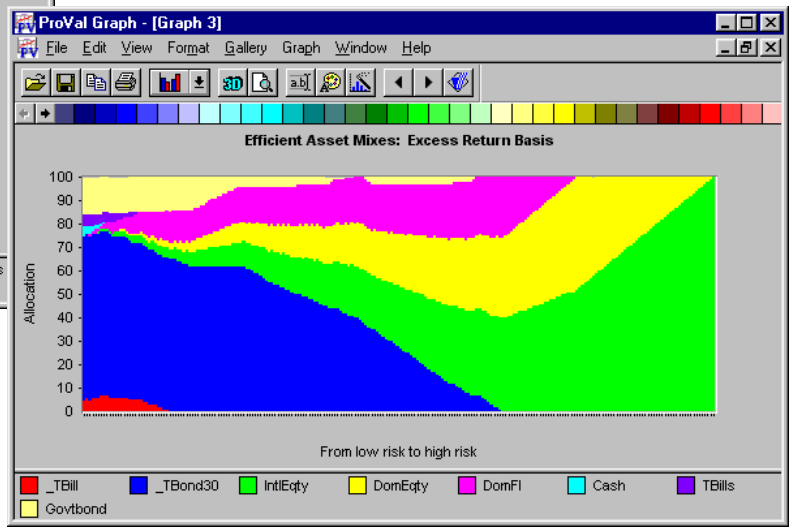

On the allocation graph, the colored areas will always fill to the top of the graph, as the total allocation will always be 100%. The amount of any given color vertically represents the allocation to a particular asset class. The horizontal axis represents increasing risk as you move from left to right.




If you are graphing data from an excess return efficient frontier you will get two sets of graphs: one on the excess return and standard deviation basis and one on the asset-only return and standard deviation basis. Each of the graphs will have a red line illustrating the excess return efficient frontier mixes and a blue line illustrating the asset-only return efficient frontier mixes. You can see that on a liability-adjusted basis, the excess return mixes are superior (higher return for the same standard deviation) than the asset-only return mixes. You can also see that on an asset-only return/standard deviation basis the excess-return mixes are the same as the asset-only return mixes for the high risk/high return part of the efficient frontier, but they differ significantly in the low risk/low return part of the frontier.

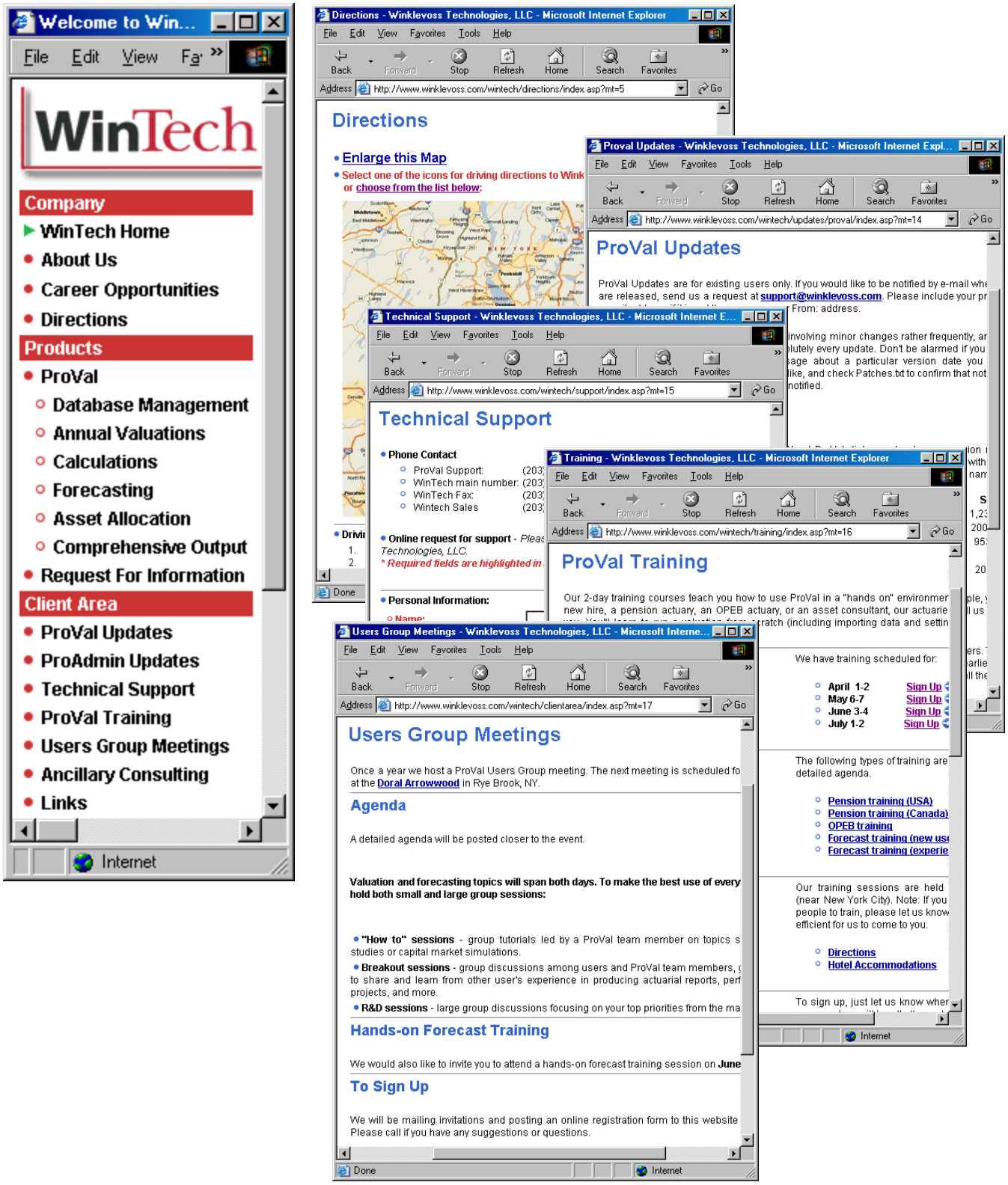



Similarly, when you look at the asset mix allocation graph for the excess-return mixes you see that the low-risk/low return mixes are commonly made up of long term bonds (blue below), whereas in the asset-only efficient frontier, the low risk/low return area is significantly made up of T-Bills (red above and on the left).



# Website Improvements

The Winklevoss Technologies website, www.winklevoss.com, has been expanded and improved to let you ask technical support questions, download updates, sign up for training sessions, learn more about the 2002 Users Group Meeting, and more online …

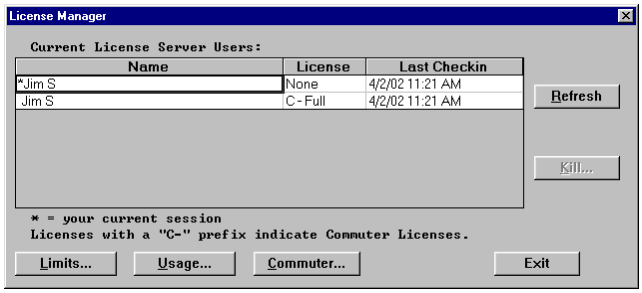


# Commuter Licenses

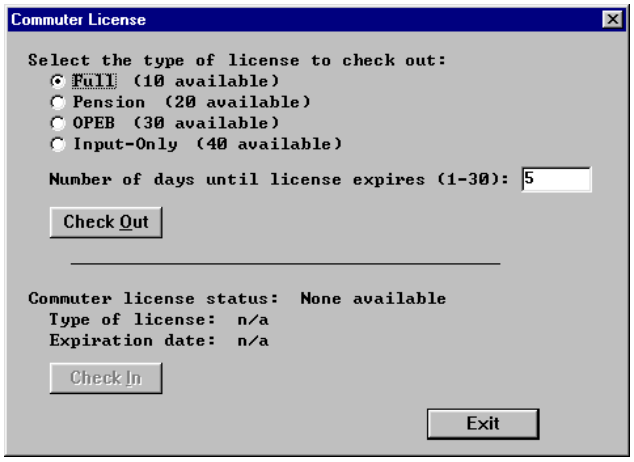
ProVal version 2.18 introduces Commuter Licenses to the ProVal License Server ("PVLS"). A Commuter License allows users to check out a license from the PVLS. Once checked out the user may hit the road and not worry about being connected to a network license server or lug around a hardware key. The commuter license is a software solution that maintains the same functionality as being attached to the PVLS.

### How to

From the **File** menu, click **License Manager**. Currently checked out commuter licenses are listed with a "C-" prefix.




Click the **Commuter…** button at the bottom of screen to check out or check in a commuter license (only one of these is available at any one time).

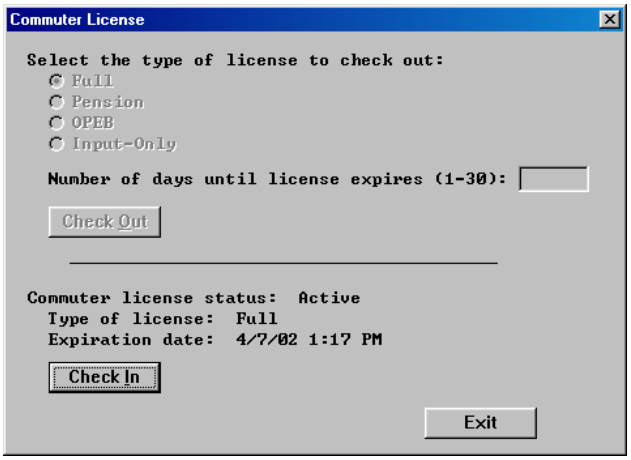



To check out a license, simply select the type of license, enter a number of days and click **Check Out**. The numbers of licenses available for checkout are displayed to the right of each license type.

Checking out a license creates a file ("*Commuter.Dat*") in your ProVal directory. It contains information including the type of license checked out, the expiration date and a fingerprint of the computer the license was checked out on. Due to this computer fingerprint, the *Commuter.Dat* file may not be moved from machine to machine.

A commuter license may be checked out for between 1 to 30 days. During this period, the PVLS will maintain a record of the checked out commuter license. One less license will be available to other users until the commuter license is checked back in or it expires. Once the expiration date is reached the commuter license will automatically become inactive.

Checking in a license is just as easy. Clicking on the **Commuter…** button will display the commuter license type and expiration date. By clicking the **Check In** button the *Commuter.Dat* file will be deleted and the license will be released to the PVLS (note: you must be connected to the same PVLS to check in a license).




### Warnings

Do not tamper with the *Commuter.Dat* file, which may cause the file to become corrupted. Once corrupted the commuter license will no longer be valid and there will be no way to check the license back into the license server. The license will remain checked out from the PVLS until its normal expiration time.

## WinTech's Virtual Back Office!

A little-publicized service offered by WinTech to our clients is a kind of virtual back office. Need help bringing up new clients, converting cases or just help during the busy season? Why not call upon WinTech's experienced actuaries to fill in?

Contact Mark Ruloff at (203) 861-5530 for details or to request a quote.

## The ProVal Team is Growing!

**Joe Gilbert** joined our WinTech team in September. He has taken over as the director of marketing following Gary Adams' retirement last August.

**David Ziegler** and **Noel Hager** have also recently joined our team. They will be assisting with support questions, training sessions, and projects you send to WinTech's virtual back office.

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