EMPLOYER SPONSORED PENSION BENEFIT PLANS

PENSION ESTIMATION PROGRAM DOCUMENTATION

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TABLE OF CONTENTS

LIST OF TABLES

PROGRAM OVERVIEW

This program is designed to estimate the pension entitlements held by respondents in the 1989 Survey of Consumer Finance (SCF), the 1989 National Longitudinal Study of Mature Women (NLS) and the Wave 1 Health and Retirement Study (HRS), based on the plan formulas and benefit provisions obtained from the linked sample of pension providers. The pension program uses systems of equations to represent each of the pension plans, including all benefit formulas and payment provisions. These equations, in turn, use as input the work and income histories of the respondents. When combined with assumptions needed for the estimation of the present value of future benefit flows, the program calculates the appropriate pension entitlements, and prepares output data files for subsequent analysis.

Program users have complete control over the input data and estimation parameters, providing the capability of a wide array of analytic strategies. Estimates can be made for any set of respondent employment characteristics, whether based on the actual survey data or simulated profiles. The pension entitlements due from any one or from every pension plan can be calculated. The program provides estimates of all types of retirement benefits-normal retirement, early retirement, late retirement, disability retirement, and surviving spouse benefits. Care should be exercised in the interpretation of disability benefits. These are benefits paid solely from the pension plan. The firm may have other longterm disability plans, and these are not analyzed in arriving at the stated disability benefit. The date of employment termination-which must be assumed for most participants since they were still working at the time of the survey-can be set or limited to any given age range or calendar dates. In addition to estimates based on a single quit date, the program can also produce an estimate of the benefit amount due at every age from the time of the survey until the participant reaches the maximum quit age allowed. These yearly estimates cover all types of retirement, disability and survivor benefits.

This document describes the program, and defines user commands and analysis options.

PROGRAM EXECUTION COMMANDS

The Pension Provider application is actually 2 computer programs that work together. 1) the pension plans procedures generation program (Gen95.exe) and 2) the pension plan calculation program (Calc95.exe). There is also a third program used to integrate the Gen95.exe output into the Calc95.exe source code, this is Integ95.exe.

The Gen95 program has 2 required command line parameters, 1) the Osiris dictionary file name (DictFileName) and 2) the pension data survey file name (DataFileName). The included OSIRIS dictionary file, PENDAT.NEW, is applicable to the SCF, the NLS and the HRS studies. The command line syntax for the Generate program is:

Gen95 DictFileName DataFileName

From the dictionary and data files Gen95.exe produces two Pascal cases lists (Cases.pas and Cases2.pas) and one Pascal procedures (Procedur.pas) files. These three files are Pascal source code statements.

The program Integ95.exe is used to insert the Cases.pas and Cases2.pas files into the source code of the evaluation unit of the Calculate source code. It also splits the procedures in the file Procedur.pas into units (files) that are small enough to be compiled by Borland Pascal and adds the names of the procedure files to the list of compilation units.

The Integ95.exe command line syntax is:

Integ95 OriginalEvalUnitName OutputEvalUnitName ProceduresFileName

CasesFileName Cases2FName

Since all of the files used by the Integ95.exe program are produced by the Gen95.exe or used by the Calc95.exe program, unless the user changes the Gen95.exe output file names and modifies the Calc95.exe source code files the following call to Integ95.exe can always be used:

Integ95 Eval95.pas Evalu95.pas Procedur.pas Cases.pas Cases2.pas

Once Integ95.exe has been run the calculation program source code can be compiled to create Calc95.exe.

The Calc95 program uses 6 or 7 command line parameters, 1) the run type value, 2) the participant characteristics data file, 3) the parameters file, 4) the pension plans file (RUNTYPE 4.2 ONLY), 5) output data file, 6) the output table file and 7) the output errors file. Valid values for parameter #1, the run type (RUNTYPE) are:

1.2 when the input is actual respondent and spouse data, which is to be matched to the specific employer sponsored pension plans in which they participate, with all estimates based on an assumed quit date. This run type produces present values and annuities, the others produce only annuities.

3.2 when the respondent and spouse data is matched to the specific plans in which they participate, but no single quit date is assumed. Instead of one estimate, this program option produces the estimated pension entitlement that would accrue if the participant quit for each year from the minimum quit date to the maximum quit date. The min and max quit date ranges are calculated from the quit age and date ranges and the survey date set in the INPARM file, and the date the participant reaches age 80, with a maximum of 55 quit date years of calculations. This output thus gives the profile over time of potential pension entitlements depending on the date of job termination.

4.2 when the input data is for simulated participant income and work histories. The simulated data (participant characteristics) in the INDATA.SIM file may include up to 5 data sets to run the plans on. For each set of simulated participant characteristics, the benefit entitlement that would be due under every pension plan included in the INPLAN file is calculated. This option requires an assumed quit date. Any number of plans may be used, provided that the plans listed were compiled into the Calulate program.

Parmeter #2, is the participant input data file (INDATA[.SIM]). Parameter #3 is the user defined parameters file (INPARM). Parameter #4, the pension plans file is only used for and is required for run type 4.2 (INPLAN). Parameters #5, #6 & #7 are the output files (OUTDATA, OUTTAB, & OUTERR).

The Calc95.exe command line syntax is, [ ] signify the optional parameter:

Calc95 RunType InputDataFile InputParameterFile [InputPlanFile] OutputDataFile OutputTableFile OutputErrorFile

Later in the documentation you will see the Calc95.exe parameters defined, the names used for these parameters will be RUNTYPE, INDATA, INPARM, INPLAN, OUTDATA, OUTTAB and

OUTERR. RUNTYPE is defined above, the others are files.

The following is an example of the commands needed to run a complete session (Generate, Integrate, Compile and Calculate for each runtype):

```
GEN95 DICTFILE.SCF DATAFILE.SCF
INTEG95 EVAL95U.PAS EVALU95U.PAS PROCEDUR.PAS CASES.PAS CASE2.PAS
BPC /GD /B /CP /$N+ /$E+ CALC95
DEL EVLP*.*
CALC95 1.2 INDATA.SCF INPARM.SCF OUTDATA1.SCF OUTTAB1.SCF OUTERR1.SCF
CALC95 3.2 INDATA.SCF INPARM.SCF OUTDATA2.SCF OUTTAB2.SCF OUTERR2.SCF
CALC95 4.2 INDATA.SCF INPARM.SCF OUTDATA3.SCF OUTTAB3.SCF OUTERR3.SCF
```

Descriptions of the previous example command lines:

1) Run the generate program with dictionary file DictFile.scf, and data file DataFile.scf.

2) Run the program to integrate the Pascal source code output by Gen95.exe into the calculate program source code.

3) Compile the calculate program with Borland Pascal as a DOS Protected Mode program.

4) The DEL EVLP*.* command deletes the unit (.pas) and object (.tpp) files that were created from Procedur.pas by Integ95.exe and the Borland Pascal compiler BPC.exe, respectively.

5, 6 & 7) These are runs of the calculate program Calc95.exe, for the 3 run types, 1.2, 3.2 and 4.2. See run type descriptions above.

The Evlp*.* files and the files Procedur.pas, Cases.pas and Cases2.pas may be deleted after compilation of the calculation program for the current data set, which will free up some disk space. If they are deleted before the calculate program, Calc95.exe, is successfully compiled the generate program (Gen95.exe) will need to be rerun on the same files to create them again. Any questions regarding printing of these output files should be directed to the users computer support person. The input and output file names for both the generate and calculate programs are unimportant as long as they meet the DOS file name requirements, see your computer support person if you do not know the DOS file name requirements. Bear in mind that if you run multiple calculate sessions at a time, as in the previous example, you should name the output files differently for each session to avoid having the earlier files be overwritten. Unlike the MTS version of the calculate program, multiple data sets cannot be stored in 1 file with Calc95.exe being instructed to start processing at a specified line number.

CALCULATE PROGRAM (CALC95.EXE) INPUT FILES

Participant Data

INDATA represents the file name where participant input data is stored. The program expects the input data to be in free format (data values separated by blanks), with one participant/plan combination per line. If a respondent was covered by more than one pension plan, the data should appear on two or more separate lines, each associated with its own unique pension plan ID. And since pension entitlements were recorded for both the respondent and the spouse, a single household record is often the basis of multiple input lines.

The program treats each line in the INDATA file as a separate case (see Wage History special case below), and will only calculate estimates for those cases included in this file. The number of cases included in the INDATA can be as few as one or as many as the full sample of participants. Any subset of participants, in any order, can be selected for inclusion in the INDATA file.

The program option RUNTYPE determines the type and order of input data expected by the program. When the analysis uses the actual household data, the program expects each data line to begin with the IDs which identify the specific pension plan which covers the participant. When the program uses simulated participant data, these ID variables are not allowed since estimates are calculated for all pension plans listed in the INPLAN file.

In addition to the data necessary to calculate pension entitlements, the input data file can also contain additional variables that will be added to the output data set. These "pass through" variables can be entered in any format, but can not exceed 132 columns in total, counting blanks. This option facilitates the easy analysis of the output data file, since there is often no need to remerge the output data files with the original SCF data files. The additional variables are "passed through" to the output data set only when the RUNTYPE is designated for actual household data with a given quit date (RUNTYPE 1.2). The other RUNTYPEs ignore the presence of the "pass through" data in the input files.

Each line in the INDATA file must list the input variables in a fixed order, separated by blanks. If **Wage Histories** for the participants are used the INDATA file will have 2 or more lines per participant. The first line is the standard data and "pass through" variables, the second

and subsequent lines, until the terminator code is reached, are the wage histories. The required order and variable definitions are given in Table 1. The first three variables are optional, depending on the RUNTYPE specified. These linking IDs are needed when actual participant data are matched with the specific pension plans under which they are covered (RUNTYPE 1.2 or 3.2), but are not needed when simulated data is used (RUNTYPE 4.2). The next to the last variable listed is also optional, and is used to define the "pass through" variables. "Pass through" variables are values that are only read in from the INDATA file and written out to the OUTDATA file. They affect no other output or calculations. The "pass through" variables must fit into 32 characters. If Wage Histories are used, they will appear on the next line.

Table 1

Participant Data
(INDATA File)

Order		Var Name	Definition
Act	Sim		
1		HHIDX	SCF household ID.
2		CODEID	Pension plan ID.
3		SEQ#	ID of pension plan/provider.
4	1	SPOUSEBD	Birth date of spouse, if married.
5	2	SEX	Sex of the participant.
6	3	BIRTHD	The participant's date of birth.
7	4	HIRED	The date the participant was hired.
8	5	QUITD	Date the participant terminates employment.
9	6	WKHRS	Average annual paid work hours.
10	7	WAGE	Annual dollar amount of salary and wages.
11	8	WAGEG	Differential wage growth rate.
12	9	CRVOL	...Voluntary contributions.
13	10	BETA1	Wage growth equation coefficient. NEW '95
14	11	BETA2	Wage growth equation coefficient. NEW '95
15		PT	Pass through variables.
16	12	WAGEHSTS	Optional Wage Histories,max yrs=97.NEW '95

The SPOUSEBD variable is defined as the marital status of the participant at the time of retirement. If the participant is single at the time of retirement, this variable should be set equal to zero; if married, the variable should be set equal to the birth date of the spouse. The

participant's date of birth, date of hire., and quit date are defined as BIRTHD, HIRED, and QUITD, respectively. All date variables are entered as real numbers, using decimals to indicate fractions of years. For example, April 1, 1965 would be entered as 1965.25, and July 1, 1983 would be entered as 1983.50. The sex of the participant was defined as one for males, and two for females.

The WKHRS variable is defined as the average annual number of paid work hours over the relevant horizon for pension calculations. The major impact of the WKHRS variable is in determining the accrual rate for service credit. This variable should be set to the average number of hours worked per year, counting all paid vacation, holiday, and sick time. For a full time worker, this would usually be 2,080 hours per year.

The WAGE variable is defined as the annual amount of salary and wages covered under the pension plan as of the time of the survey if the participant was still employed, or wage level in the final year of employment if the participant had already terminated employment but had not yet begun to receive retirement benefits. From this base level, two separate income growth factors are applied to calculate the level of WAGE over time. The first income growth factor is specified in the input parameter file. This parameter is defined as the overall average real rate of growth in wages, and is applied to all participant data. The second income growth factor, specified in the input data file, is designed to capture differences in growth rates across population groups. The input variable WAGEG is defined as the deviation from the overall mean for specific participants, given their age, income and employment histories, and other factors. Since the WAGEG variable can be constructed so as to sum to zero across all participants included in the analysis, the overall total rate of income growth can be fixed via the input parameter file.

The CRVOL variable is defined as the amount of voluntary contributions made by the participant, expressed as a percentage of the participant's annual wages. For participants that do make voluntary contributions, the CRVOL variable defines the average yearly contribution rate over the time horizon used for pension calculations. For pension plans that require contributions from participants, the mandatory contribution rates are built into the pension program, and thus do not need to be specified in the input data file.

The BETA1 and BETA2 values are the coefficients to be plugged into the new wage

calculation formula. The new wage model can be in the Enhancements and Fixes section of this document.

The WAGEHSTS variables are optional, a new flag is provided in the INPARM file to define if wage histories are being used. The wage history ALWAYS starts on a new line following the participant data values, this allows for the pass through variables to remain where they currently exist, at the end of the main data line. The format for the wage histroy variables is as follows: the first value is the year the wage history starts, the second value is the year the wage histroy ends, the wages for the years included come next, the end of history marker is a negative number. If wage histories are supplied, they are expected for all respondents. A full wage history for the pension plan firm is not required, the minimum is one year. If no history is available for a respondent, the survey date year and the survey date wage can be used. See the examples in Enhancements and Fixes section of this document.The wage history can span more than 1 line. The end of history marker negative value is required. Wage histories are expected to cover only those years the respondent worked for the firm whose pension plan is being used. If the first year a wage is supplied for is the hire date year, the wage is expected to be ONLY the wages earned from the pension plan firm.

Estimation Parameters

INPARM represents the name of the file which contains the user defined parameters needed in the estimation process. The parameter settings must be given in a fixed order on each line. Each line must start with the parameter settings and may be followed by a comment. Only the parameter settings on each line are read by the program, the rest of the line is ignored. The required contents of the INPARM file are shown in Table 2.

Table 2

Estimation Parameters
(INPARM File)

Line	Name	Default	Definition
1	SURVEYD	1989.50	Date of survey observations
2	TODAYD	1989.50	Base date for present value calculations
3	CPIrate	0.00	Annual inflation rate
4	INTrate	1.00	Real interest rate
5	INCrate	0.00	Real wage and salary growth rate
6	SSWB	1.00	SS wagebase (as of survey date)
7	SSWBrate	0.00	Real SS wagebase growth rate
8	SSrate	0.00	Real SS benefit growth rate
9	QAGErng	16 80	Quit age range (min, max)
10	QDATErng	1925 2075	Quit date range (min, max)
11	BENMAX	500000 500000	Maximum benefits (age55, age65)
12	PROFCON1	5.00 0.50	Contributions (profits, forfeitures)
13	PROFCON2	5.00 0.50	Contributions (profits, forfeitures)
14	PROFCON3	5.00 0.50	Contributions (profits, forfeitures)
15	DISCRE1	0.00	Maximum % discretionary contributions
16	DISCRE2	0.00	Maximum % discretionary contributions
17	DISCRE3	0.00	Maximum % discretionary contributions
18	NACONrate	5.00 5.00	NA contributions (other, mandatory)
19	NAVOLrng	0.00 0.00	NA CRVOL range (min, max)
20	NAMATCH	100.00 100.00	% NA matching (MMAN, MVOL)
21	ANNTYPE	3.00 50.00	Annuity type / % of payment continued
22	VESTYPE	0.00 5.00	New vesting (1=on/0=off) / Yrs to vest
23	MRAGE	0.00	Plan maximum retirement (1=on/0=off)
24	PENTYPE	0.00	Pension type (0=NRT/ERT/VDT/LRT,1=DRT,2=DST)
25	FYA_PV	0.00	1stYrAnnuity/PresentValue flag, 0=FYA, 1=PV
26	WAGEHIST	0.00	Wage histories flag, 0=no, 1=yes
27	NOMIDX	0.00	Nominal Amounts indexing flag, 0=no, 1=yes
28	BENCOLA	0.00 100.00	Benefits COLA, 0=no, 1=yes; % of CPIrate
29	TODAYPV	0.00	TODAYD Present Value flag, 0=no, 1=yes

The first two parameters, SURVEYD and TODAYD, are dates used to set the program's time reference. The first date, SURVEYD, is used to set the time frame for all input variables.

This date defines the base period data values to which all growth factors are applied to estimate future trends. The second date, TODAYD, defines the year on which to base the discounted present value calculations. For most purposes, both these dates should be set to equal the actual date of the household survey. If the date for present value calculations is set to a date later than the survey date, this would result in estimates of the present value of entitlements for subsequent years. All growth factors are annual percentage rates of change, and are defined as the average rate over the relevant horizon for pension calculations. Setting the nominal rate of inflation along with the real rates of change in the other variables, gives users the ability to set the overall level of nominal rates of change while preserving real growth rates. In setting these values, the most important consideration involves the comparative size of the selected real growth rates for wages and interest rates. The former rate is used to increase amounts over time, while the latter is used to discount amounts back to the present. Although it is usually assumed that the former is lower that the latter, the selected size of the difference will have an important impact on the estimated results.

All growth rates are entered as average annual percentage amounts-for example, an annual growth rate of 3.5% is entered as 3.5. A zero real rate of growth yields a nominal growth rate equal to the rate of inflation. Growth rates may be set to either positive, zero, or negative values for the rate of inflation, income, and the Social Security wagebase and benefit amounts; the real interest rate, however, must be set to a value of greater than zero. This combination of optional settings allows the easy manipulation of the estimation assumptions, in a format that focuses the selection on both the nominal and real rates. As part of the program output, all the nominal rates are calculated and displayed in the file OUTTAB.

The inflation rate is intended as a common yardstick for assessing changes in all dollar values over time. The inflation rate selected represents the average rate of price increases over the entire relevant horizon for pension calculations. The real interest rate variable is defined as the appropriate rate of discount to use in present value calculations. The real growth rate of income is defined as the average annual increase in salaries and wages received by plan participants, adjusted for inflation. Thus, all three variables are similar in that they signify general concepts, and are not identified with any specific price or wage index, or with a particular interest rate.

Since an estimate for an extended future time period is often needed-say over the next 10 to 50 years-these rates should be chosen carefully. A needlessly high inflation rate, holding constant real growth rates, will only result in needlessly high nominal dollar values as the estimation time period lengthens.

The program options concerning the permissible quit age and date ranges are distinctive parameters in that they permit the censoring of the input data. When the maximum specified quit age is 65, the program will automatically cause all pension estimates to be based on a quit age of no higher than 65. If any of the input data records include a QUITD later than age 65, the data record will automatically be revised to reflect this age limit. Similarly, a limit on the quit date of 1983.5 would cause all pension estimates to be based on quitting as of the date of the survey. The minimum quit age/date option can be used to adjust the input data to restrict the minimum QUITD to age 55, or age 62 for example. The combined use of minimums and maximums can adjust all quit dates so that everyone retires at a certain age or on a certain date. For example, if all participants were assumed to retire at age 65, both the age minimum and maximum would be set equal to this age. Or if all pension entitlements were to be calculated as though all participants terminated employment as of the date of the survey, the minimum and maximum dates would be set equal to the survey date. Various combinations of quit age and date ranges can be selected to reflect any desired restrictions on the time of employment termination. This program option allows greater flexibility in data analysis since separate input data files are not needed to analyze differences in quit dates.

The Social Security variables formerly defined the level of the wagebase and benefit levels as of the date of the survey, as well as the real annual rates of growth in these amounts over time. They now only define the level of the wagebase,SSWB; the growth rate of that base, SSWBrate; and the benefit growth rate,SSrate. The Social Security wagebase variable is the maximum wage and salary income subject to Social Security taxation. The wagebase growth rate is the percentage rate of increase for the SS wagebase. The benefit growth rate is the benefit COLA adjustment percentage for the SS benefits. The variables that defined the benefit levels are no longer needed with the new SS benefit calculation algorithm. The Social Security benefit is now calculated using an algorithm supplied by a pension consulting firm. This algorithm calculates

benefit amounts for those same conditionals -- early/normal, primary/joint, etc -- as were previously calculated. The output is no longer based on an "average" benefit, but based on the respondents wage history. A list of the INPARM Social Security variables that are no longer used is the Enhancements and Fixes section.

The input parameter BENMAX controls the maximum benefit that the program will allow before truncation. The maximum is entered in two steps, the first applies to the maximum amount that can be received at age 55, the second applies to the maximum annual pension benefit that can be received at age 65. If the latter maximum exceeds the former, the maximum is interpolated for retirement ages between 55 and 65. Of course, both could be set to a very large value to avoid the use of this truncation parameter.

For defined contribution pension plans that base contributions on measures of profitability, the input parameter PROFCON can be used to set the average rate of contributions over the time period used for pension calculations. Since some pension plans incorporate more than one formula that is based on contributions linked to profits, three separate values can be assigned. Pension plans with only one profit based contribution formula would use the variable PROFCON1. If a second profit based formula was included in the same plan, PROFCON2 would also be used. Similarly, PROFCON3 would only be used for the third profit based formula included in any single pension plan. Each of the variables is defined in terms of the proportion of annual wages that these contributions represent. In addition, many defined contribution plans also provide for the allocation of forfeitures to current plan participants. The amount of contributions from forfeitures can be set in the INPARM file. As with the profit link contributions, three separate rates can be set, each defined in terms of the proportion of annual wages the contributions represent.

The discretionary contributions, DISCRE1, DISCRE2 and DISCRE3 are matching contributions, but unlike the profit sharing are based on non financial criteria.

A few defined contribution plans provided insufficient information to determine the basis and amount of employer contributions. For these plans, the variable NACON can be used to set the rate of contributions expressed as a proportion of annual wages. A few other plans had mandatory contributions, but failed to specify the required contribution rate-usually because the

mandatory contribution had been discontinued at some distant point in the past. For these plans, the unascertained mandatory contribution rate can be set, using the second value on the NACON line, defined as a proportion of annual wages. For plans that did not specify the permissible range of voluntary contributions, the minimum and maximum rates of voluntary contributions are determined by the NAVOLrng variable in the INPARM file. The minimums and maximums are expressed as proportions of annual wages. Lastly, a few plans did not specify the rate at which they would match mandatory or voluntary contributions. The matching rates can be set via the NAMATCH variables in the INPARM file. The rates are given in percentage terms, with dollar-for-dollar matching expressed as 100.

The INPARM variable ANNTYPE selects the type of pension annuity the program calculates. When ANNTYPE is set to 1, all pension benefits are calculated as single life annuities; when set equal to 2, all benefits are calculated as two-life annuities; and when set equal to 3, benefit annuities are calculated as either single or joint life annuities depending on whether the participant is married-as given in the INDATA file. If joint life annuities are selected, the variable CONTPMT gives the proportion of the initial annuity payment continued after the first death. All annuity calculations are based on yearly survival probabilities, which are determined by the sex and birth date of the participant and spouse given in the INDATA files.

To allow for changes in pension plan provisions since these data were collected, two additional options are provided. The variable VESTYPE in the INPARM file controls the vesting formulas. When this variable is set equal to 0 the program uses the original plan provisions; when set equal to 1, the program substitutes a "cliff" formula, defined by the VESTYRS variable. The VESTYRS variable gives the number of years until full vesting occurs. The second option allows users to determine whether the plan specified mandatory retirement age is used. When the variable MRAGE is set equal to 1 the plan provisions are used, and when set equal to 0, no mandatory retirement age is used in the calculations.

The final parameter in the INPARM file selects the type of pension benefit to calculate. In most instances the PENTYPE variable should be set equal to 0, allowing the plan provisions to determine the type of retirement benefit based on age, years of service, and so forth. For the special cases of disability and survivor benefits, this parameter allows estimation of benefits under

those circumstances. When the PENTYPE variable is set equal to 1, the program calculates disability retirement benefits, using the quit date as the date of disablement. When the PENTYPE variable is set equal to 2, the program calculates survivor benefits, using the quit date as the date of the death of the participant. The PENTYPE option does not affect RUNTYPE 3.2, since this RUNTYPE is designed to generate estimates of all pension types.

There are 6 new parameters in the new system, FYA_PV is a flag for the vested benefits amount output type, the First Year Annuity (the original output type) or the Present Value. WAGEHIST is the flag to the use of wage histories. NOMIDX is the flag to Index Nominal dollar amounts to inflation. BENCOLA represents two variables, one is the flag to allow Cost Of Living Adjustment to those plans which do not include a built in COLA, and the other is the percentage of annual inflation rate (CPIrate) to use in the adjustment. TODAYPV is the flag for adjustment to the Present Value calculation in relation to the Today's Date variable, see the description of enhancement #5 in the Enhancements and Fixes section of the documentation for more detail.

Pension Plans

When analysis is based on simulated data cases, the program will generate estimates under every pension plan listed in the INPLAN file. The file Inplan.scf includes all of the pension plans included in the SCF sample. Any subset of 5 plans can be included in INPLAN for use in calculating with run type 4.2. Using both the INDATA and INPLAN files allows the user to limit estimates to just one participant under one pension plan, to as many simulated participant histories as desired under all of the plans included in the study.

The IDs included in the file INPLAN are the CODEID and the SEQ#. Each line in the file must begin with the number "9" in column 1 and any unique four digit index starting in column 2. Separated by blanks, the CODEID and the SEQ# follow. All defined benefit pension plans have CODEID numbers under 3000, defined contribution plans have IDs numbered in the 3000s, and plans that combine both features have IDs starting at 5000.

Valid Ranges

The program checks all input data and parameter settings for valid ranges. The check for valid ranges will only detect gross errors in the input data. The program allows for a wide range of data, including levels that would be thought be many to be extreme values. This check in no way insures the reasonableness or accuracy of the input data and parameters. For example, the valid date ranges often cover 100 years or more, and only values outside this extended period are flagged by the program as invalid. When the program encounters an invalid data value or parameter setting, that value is automatically recoded to a default value that lies within the valid range. When this occurs, the program notes this problem in the OUTERR file. The valid ranges for the parameter settings are given in Table 3, and the valid ranges for the input participant data are given in Table 4. Both tables include the recoded values the program automatically assigns to input data falling outside of the valid range.

Table 3

Valid Ranges for Input Parameter Settings

Variables	Valid Range		Outside Range Program Recode Value
	Minimum	Maximum	
SURVEYD	1980.00	2000.00	1983.50
TODAYD	1980.00	2000.00	1983.50
CPlrate	- 25.00	25.00	0.00
INTrate	0.00	20.00	1.00
INCrate	- 20.00	20.00	0.00
SSWB	1.00	200000.00	1.00
SSWBrate	- 20.00	20.00	0.00
SSrate	- 20.00	20.00	0.00
QAGE MIN	16.00	80.00	16.00
QAGE MAX	16.00	80.00	80.00
QDATE MIN	1925.00	2075.00	1925.00
QDATE MAX	1925.00	2075.00	2075.00
BENMAX 55	0.00	500000.00	500000.00
BENMAX 65	0.00	500000.00	500000.00
PROFVOL1	0.00	30.00	5.00
FORTVOL1	0.00	10.00	0.50
PROFVOL2	0.00	30.00	5.00
FORTVOL2	0.00	10.00	0.50
PROFVOL3	0.00	30.00	5.00
FORTVOL3	0.00	10.00	0.50
NACON	0.00	30.00	5.00
NAMAN	0.00	30.00	5.00
NAVOLrng MIN	0.00	30.00	0.00
NAVOLrng MAX	0.00	30.00	0.00
NAMATCH MAN	0.00	200.00	100.00
NAMATCH VOL	0.00	200.00	100.00
ANNTYPE	1.00	3.00	3.00
CONTPMT	0.00	100.00	50.00
VESTYPE	0.00	1.00	0.00
VESTYRS	0.00	25.00	5.00
MRAGE	0.00	1.00	0.00
PENTYPE	0.00	2.00	0.00
FYA_PV	0.00	1.00	0.00
WAGEHIST	0.00	1.00	0.00
NOMIDX	0.00	1.00	0.00
BENCOLA	0.00	1.00	0.00
BENCOLA PCTCPI	0.00	100.00	0.00
TODAYPV	0.00	1.00	0.00

Table 4

Valid Ranges for Participant Data Variables

Variables	Valid Range		Outside Range Program Recode Value
	Minimum	Maximum	
SPOUSEBD	0.00	2000.00	BIRTHD
SEX	1.00	2.00	1.00
BIRTHD	1880.00	1970.00	1950.00
HIRED	BIRTHD+16	BIRTHD+65	BIRTHD+20
QUITD	HIRED	BIRTHD+80	BIRTHD+65
WKHRS	1.00	2080.00	2080.00
WAGE	1.00	1000000.00	1.00
WAGEG	20.00	20.00	0.00
CRVOL	0.00	30.00	0.00

OUTPUT FILES

Generate Program Output Files

Source Code Files

Procedur.pas	--	Plan procedures source code file.
Cases.pas	--	All plans case statements source code file.
Cases2.pas	--	Integrated plans case statements source code file.

Plan Variables Information Files

PassFail.txt	--	Pass/Fail results for the plans.
Notefile.txt	--	Notes on the plan variables.
Problems.txt	--	Problem notes on the plan variables.
Formfile.txt	--	Form notes, also contains PassFail.txt.
Formulas.lst	--	A listing of the pension plans formulas.

Calculate Program Output Data Files

OUTDATA represents the name of the file where the program will write output in free format, with one participant/plan combination per line. As with the input data file, each line represents the estimated pension entitlements from a single plan. The total household pension entitlement is thus the sum of entitlements due under all plans in which the respondent or spouse participates. For estimates of household pension wealth holding, estimates for the respondent and the spouse must also be combined.

The type and order of variables that are written into the OUTDATA file are defined by the RUNTYPE specified. For analyses based on actual participant data with given quit dates (RUNTYPE 1.2), the output variables are shown in Table 5. The output variables from analyses of simulated data (RUNTYPE 4.2) are given in Table 6. Since each run allows up to five simulated data cases, this basic set is repeated up to five times on each data output line. When the program calculates the pension entitlements due at all possible future quit dates (RUNTYPE 3.2), the output variables are as shown in Table 7. Note that, unlike the above output data sets written one case per line, this data set is written in blocks, giving all the data for a particular case in a

series of contiguous lines. When printed, the output will occupy one page per case. The output file from this RUNTYPE is very large, especially when generated for the full sample of cases.

All the data entries in the OUTDATA file are numeric. While most of the output variables are coded in natural units (dollars and years), the variable that represents the type of pension for defined benefit plans is coded 1 for normal retirement, 2 for late retirement, 3 for early retirement, 4 for vested deferred, 5 for disability, and 6 for survivor benefits. For defined contribution plans, the variable is coded 7. For those pension plans that had a combination of defined benefit and defined contribution provisions, the code 11 was used for

normal retirement, 12 for late retirement, 13 for late retirement, 14 for vested deferred, 15 for disability, 16 for survivor benefits, and 19 if only the contribution formulas were used. If the participant did not qualify for any type of retirement benefit, this variable was set equal to 9. The program assigns the missing data code of - 1 to any plan that generates errors in calculations when combined with the input data and assumptions.

OUTTAB represents the name of the output file to which the program will write a summary of the estimation parameters that were used in that particular replication, and text headings for the output data file. This file is suitable for obtaining a printed copy of the estimated pension benefits for each case.

OUTERR represents the file name to write the program produced summary of any suspect dollar figure calculations in any portion of the estimation procedures. The file contains short messages about potential problems, indicating the case IDs and a list of the data values. That a case has been flagged for inclusion in the problem file does not necessarily mean that the calculated value for the participant is incorrect, but that in the calculation process there were some suspect intermediate results.

All of the output files are created new or emptied if the already exist for each run of the calculate program. If multiple runs are done be sure to name the output files with different names for each run.

Table 5

Output Data File for Entitlement Estimates
Based on Actual Participant Data with Given Quit Date
(RUNTYPE 1.2)

Order	Name	Definition
1	HHIDX	SCF Household ID
2	CODEID	Pension Plan ID
3	SEQ#	Pension Plan/Provider ID
4	SEX	Sex of participant
5	SPOUSEBD	Birth date of spouse, if married
6	BIRTHD	Birth date of participant
7	HIRED	Date participant began employment
8	QUITD	Date participant terminates employment
9	QWAGE	Annual wage or salary at quit date
10	QASY	Number of years covered at quit date
11	PENTYPE	Type of retirement benefit
12	PENAGE	Age benefit payments begin
13	%QW	Pension benefit as percent of final wages
14	%/YR	Proportion of final wages per service year
15	30YR	Proportion of final wages for 30 years
16	ANNUALA	Initial annual pension benefit amount
17	PRVALUE	Present value of entitlement
18	A65EQVL	Equivalent annual amount if start at 65

TABLE 6

Output Data File for Entitlement Estimates
Based on Simulated Participant Data
(RUNTYPE 4.2)

Order	Name	Definition
1	CODEID	Pension plan ID.
2	TYPE	Type of pension benefit
3	%QW	Benefit as percent of final wages
4	%/YR	Percent final wages per service year
5	ANNUALA	Initial annual benefit amount
6	PRVALUE	Present value of entitlement

Table 7

Output Data File for Entitlement Estimates
Based on Actual Participant Data Using All Potential Quit Dates
(RUNTYPE 3.2)

Order	Name	Definition
1	HHIDX	SCF Household ID * new for '95
2	CODEID	Pension Plan ID * new for '95
3	SEQ#	Pension Plan/Provider ID * new for '95
4	QUITD	Date employment terminates
5	QAGE	Age at quit date
6	QASY	Total service years at quit date
7	QWAGE	Wage or salary at quit date
8	SSB	Social Security benefit amount
9	PENBEN	Pension benefit amount
10	PENTYPE	Type of retirement benefit
11	VESTED	Deferred vested benefit
12	BENAGE	Age when benefits begin
13	VEST65	Vested benefit if begin at 65
14	DABLEB	Disability pension benefit
15	DTYPE	Type of disability pension
16	NRT	Normal retirement benefit
17	LRT	Late retirement benefit
18	ERT	Early retirement benefit
19	VDT	Deferred vested retirement
20	DRT	Disability retirement benefit
21	DST	Survivor retirement benefit
22	CNT	Benefit based on contributions

PASCAL PROGRAM SOURCE FILES

Gen95.exe source code files:

Gen95.pas	-- main generate program file.
Gen95_2.pas	-- secondary generate unit.
Emit95u.pas	-- output unit.
Gvar95.pas	-- global variables unit #1.
Error95.pas	-- error output and utility functions unit.

Calc95.exe source code files:

Calc95.pas	-- main calculate program file.
CaVar95.pas	-- global variables unit.
Evalu95.pas	-- evaluation unit #1.
Eval95_2.pas	-- evaluation unit #2.
EvalVars.pas	-- evaluation variables unit.
EvErr95.pas	-- evaluation error unit.
Outsid95.pas	-- utility functions unit.
MaxReal.pas	-- secondary utility functions unit.
Cases.pas	-- plan case statements created by Gen95.exe.
Cases2.pas	-- integrated plan case statements created by Gen95.exe.
Procedur.pas	-- pension plan calculation procedures to be split up by Integ95.exe into EvlP*.pas.
EvlP*.pas	-- calculation procedures created from Procedur.pas by Integ95.exe.

Integ95.exe source code files:

Integ95.pas	-- the procedures and cases integration program source code.

DOCUMENTATION FILES

This file, the Pension Provider documentation is available as a WordPerfect 5.2 file a WordPerfect 6.1 file and as a DOS text file, Pen_PC95.wp5, Pen_PC95.wp6 and Pen_PC95.txt, respectively. The files Pen_95.hlp, a WordPerfect document, and Pen_95.txt, a DOS text file, also come with the Pension Provider for the PC, these are basic instructions on how to use the Pension Provider programs and a list of files included with the Pension Provider, '95 version. The file, Files.lst, contains a list of the files that should be extracted from the self extracting zip file, Pen_PC.exe.

SYSTEM REQUIREMENTS AND LIMITS

Minimum system requirements:

Borland Pascal version 7.0
IBM/PC compatible computer with Intel 386 or compatible CPU
4 Megabytes system memory

Recommended system requirements:

IBM/PC compatible computer with Intel 486DX or compatible CPU
8 Megabytes system memory

Hard disk space requirements will depend upon the size of the data sets being processed. Large data sets may need to be broken down into smaller sets if the system being used has less than the needed amount of system (RAM) memory. A formula for the approximate maximum number of plans that can be handled at one time is:

MIN(((FreeSysMemory - 200K) / 16K), 1100)

Example: You have the minimum required system, with 1.5M (1500K) of free system memory. MIN(((1500K - 200K) / 16K), 1100) = 93.75, you can compile and process data sets of approximately 93 plans.

The minimum size of the compiled Calculate program with 1 pension plan is about 175K. Your computer support person can show you how to determine the amount of free system memory on your computer. The MAXIMUM number of plans that can be handled by Borland Pascal v.7 is approximately 1100, more than this may not compile, 1200 will not compile. The 1100 value is for compilation using the compiler options given in the batch file supplied with the Pension Provider software, RunPen.bat.

The programs have been tested on a 386/25 IBM compatible computer with 2200K (2.2M) free of 4Meg of system RAM and a 486/66 IBM compatible computer with 14M free of 16Meg of system RAM. The 386 was able to compile and process 130 plans, the 486 was able to handle the maximum, 1100 plans. It may be possible to run this program on a 386 computer with 2Megs of RAM, however, the number of plans that can be run will be quite small, since the available system (RAM) memory will probably be less than 1000K (1M). 1000K of free system memory will let you compile about 50 plans, maybe less.

ENHANCEMENTS AND FIXES

1) Modification of the wage growth formula, following quadradic model is used:

$\ln (Et) = \alpha + (\alpha_m * \text{YearCount}) + \beta_1(A) + \beta_2(A)^2$
WHERE:
Et = annual earnings in year t.
α = earnings in the year of the survey.
α_m = the overall wage growth in the economy (nominal).
YearCount = the number of years t is since the survey year, t - SurveyDate.
A = some measure of age or tenure. We will use age.
β_1, β_2 = user defined coefficients for age terms.

The betas are allowed to vary by individual so researchers can distinguish types of jobs which may have varying earnings growth patterns (e.g. union vs. non-union jobs). These betas are to be specified in the INDATA file.
α_m, the overall economy-wide growth in wages is specified in the INPARM file

2) The new version allows users to input wage histories for individuals. A toggle switch in the INPARM file specifies whether the program is expected to estimate wages or a user input wage stream is being used. A respondent data "line" will take multiple lines if a wage history is used, one line for the normal non-wage history data and one or more lines for the wage history data. Wage histories can span multiple lines, the end of history marker, a negative number, is required.

HHID CODEID SEQ# SPOUSEBD SEX BIRTHD HIRED QUITD WRKHRS WAGE WAGEG CRVOL BETA1 BETA2 PASSTHRU
StartYear EndYear StartYearWages .... EndYearWages NegativeNumber

Ex 1 (1 regular data line and 1 wage history line):
1234 9999 321 1942.40 1.00 1940.60 1955.35 2080 25000.00 2.00 4.00 0.02 -0.0002
1970.0 1973.0 5000.00 5250.00 5600.00 5900.00 -1.0

Ex 2 (1 regular data line and a multiple line wage history):
1234 9999 321 1942.40 1.00 1940.60 1955.35 2080 25000.00 2.00 4.00 0.02 -0.0002
1970.0 1973.0 5000.00 5250.00 5600.00 5900.00 6000.00 6500.00
7000.00 8000.00 -1.0

3) A new Social Security benefits algorithm has been incorportated. This algorithm was written by a pension consulting firm in Fortran and converted to Borland Pascal v7.0 for use in the PPS calculation program. This algorithm does not require the Social Security coefficients or the SS benefits base amount variables used in the earlier versions, so they have been removed from the parameters file, INPARM. The list of SS variables removed from INPARM follows:

```
SS        -- SS benefit (base amount)
SSPUrto   -- SS primary unreduced (min, mid, max)
SSJUrto   -- SS joint unreduced (min, mid, max)
SSPRrto   -- SS primary reduced (min, mid, max)
SSJRrto   -- SS joint Reduced (min, mid, max)
SSPDrto   -- SS primary disability (min, mid, max)
SSJDrto   -- SS joint disability (min, mid, max)
SSSSrto   -- SS surviving spouse (min, mid, max)
SSCUTS    -- SS wage cutoffs (min, max)
```

4) One of the LNG equations was written incorrectly. When "After eligible for social security" is checked, "BGN=BIRTHD + SSAGE(l)" was written. The equation should read have been "BGN=MAX(BIRTHD+SSAGE(l),QUITD)", which is now the case.

5) Olivia Mitchell identified a problem with the present value calculation. If the today's date variable in the INPARM file is a date after the onset of benefits for an individual, the present value is the present value of the entire stream of payments rather than the present value of future payments. Tom Steinmeier noted that for some purposes, he would like to retain the current present value calculation. So he proposed that we incorporate a switch in the INPARM file to specify which present value was to be calculated. This has been incorporated into the program.

6) When a plan does not offer early retirement, the formula "ERQ=O" is now added to the plan calculations. This eliminates thousands of lines that were written to the error file, none of which represented real errors.

7) The original Final Average Pay calculations were incomplete. The 10 FAP types have now been fully implemented as defined.

8) The program now provides the option to allow the researcher to index nominal dollar amounts in the formulas to inflation. A switch is provided in the INPARM file to turn this feature on and off.

9) The option to adjust those plans that do not include automatic cost of living adjustments has been added. A switch is provided in the INPARM file to turn this feature on and off.

10) Previously the output in run 3.2 provided first year annuity payments over a range of hypothetical retirement years. A switch has been added in INPARM to print present values on this table instead.

CALCULATION ERROR CODES

The meanings of errors listed in the calculation output file:

INTG Invalid Seq# passed to the procedure OthCont() which calculates Integrated plans. This error is paired with a following error line containing the invalid seq# in place of the error type.

Neg- This occurs if any of the values checked in the plan procedure are less than zero.

BTWN This occurs in the function b(), the "between" function, if the value being checked or the lower limit or the upper limit is less than zero.

BBTN This occurs in the function a(), the "backwards between" function, if the value being checked or the lower limit or the upper limit is less than zero.

UPTO This occurs in the function u(), the "upto" function, if the value being checked or the limit is less than zero.

OVER This occurs in the function o(), the "over" function, if the value being checked or the limit is less than zero.

ATBE This is a begin payments date error meaning the begin date is greater than the end date, this occurs in the function Anytime().

DATA This error occurs in the procedures rrange() and irange(), the input read procedures. It means a respondent data value was outside of the range defined in the program for the variable (data value) being read.

DIV0 This means a division by zero was attempted in the pension plan procedure calculation.

AVAILABILITY OF THE PENSION PROVIDER

The Pension Provider software will be distributed through:

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