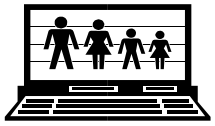
SPSD/M 

Introduction and Overview Guide

This guide is designed to give an overview and introduction to the SPSD/M. It describes the construction of an SPSM simulation run and contains several examples of model use. It should be read completely by anyone who will be using the SPSD/M for research purposes.

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Table of Contents

Introduction

Welcome to the SPSD/M. This guide presents an introduction and overview of the product and a description of the basics required to use the model. **It should be read immediately after installing the SPSD/M and before you attempt to use the program for the first time.** Most of the material contained in this guide is covered in greater detail in the *User's Guide* and *Reference Manual*. What we do here is present you with an introduction sufficient to get you up and using the model quickly. Once familiar with the SPSD/M, users of the full package can restrict their use to the *User's Guide* and the *Reference Manual*.

This software is complex. The SPSD/M is a highly flexible tool with a vast number of independently controllable, interrelated parts. It is designed to be easy to use. With extensive use of default settings, the flexibility is controlled by first time users. However, implicit in these settings are numerous assumptions which could potentially affect interpretation of the results. Moreover, the institutions and programs modeled by the SPSD/M are themselves complex. **It is thus easy to make subtle mistakes which may result in significant estimation errors.** To make the best use of the SPSD/M, please read the available documentation. Then if you have any problems or you are unsure of the simulation results, please phone us at (613) 951-3774 or email us at spsdm@statcan.ca.

WHAT YOU SHOULD ALREADY KNOW

By now you should have either the demonstration or the full version of the SPSD/M installed on your computer. If you do not, please do so now by following the instructions in the *Installation Guide*.

The guide assumes that the user is already somewhat familiar with the use of IBM type personal computers (how to turn it on, enter commands, execute programs, etc.). The user should know how to save, copy, or delete files on floppy or hard disks, type file contents at the terminal, and print text files. Users can refer to their own operating system manual for further details. The user should also be familiar with the structure and use of the MS-DOS or NTFS directory system. Since directories are often misunderstood by novice computer users, a short explanation of directories and files is given in the section entitled Quick Start.

In addition, some knowledge of federal and provincial tax and government cash transfer programs as well as some familiarity with the data sources is essential. The SPSD/M is based on several disciplines including econometrics, statistics, computer science, mathematics, and micro-simulation and training in any of these areas will be an asset.

While the SPSD/M can be used for analysis on its own, other software products can greatly compliment and enhance analysis using the SPSD/M. Knowledge of a PC-based text-editor is highly recommended. At Statistics Canada we use the Codewright editor; other examples include BRIEF and EDIT (MS/DOS). In a pinch,

some word processors can also be used for editing parameter and source code files. Spreadsheets are good tools for manipulating output from SPSM standard and custom tables. In addition, statistical software packages such as PC-SAS and SPSS are useful for subsequent analysis of simulation results.

USING THIS GUIDE

Certain portions of this guide should be read by everyone who will be using the SPSM for research purposes from junior programmers to senior analysts.

- If you are unfamiliar with the SPSD/M and never plan to use the program or analyze and interpret the results directly, you can confine your reading to this introductory chapter.
- Persons familiar with microsimulation and MS-DOS can skim certain paragraphs and sub-sections but should follow the guide as structured.

The SPSD/M is a complex static microsimulation model and must be understood thoroughly if one is to make correct inferences. The computer program itself, however, is simple to use and results can be produced very quickly with it. Overview of the SPSD/M presents the fundamental concepts which must be understood prior to conducting any research with the model. This includes a description of all the basic parts of the model and their relationships to one another. By reading this, the user will also become familiar with the specific terminology which is used throughout the documentation.

The section titled Software and Facilities describes the use and function of the SPSM user facilities. These facilities allow users to modify parameters interactively, screen or select records, produce default and custom tables and distribution reports, create new variables, and conduct marginal tax rate analyses.

After reading through the above sections, the user should proceed to the four tutorial examples. The examples are meant to be followed in order. They provide general information on using the SPSM as well as details on specific SPSM features. Many of the SPSD/M user facilities are illustrated in these examples.

The final section entitled Guide to SPSD/M Documentation gives an overview of the contents of the other two guides included with the full SPSD/M package and provides some guidelines on their effective use.

OVERVIEW OF THE SPSD/M

The Social Policy Simulation Database and Model (SPSD/M) is a tool designed to analyze the financial interactions of governments and individuals in Canada. It allows the assessment of the cost implications or income redistributive effects of changes in the personal taxation and cash transfer system.

There are four basic elements to the SPSD/M: a database (the SPSD), a model (the SPSM which is comprised of a set of simulation algorithms), data retrieval and reporting software and user documentation.

- The SPSD is a non-confidential, statistically representative database of individuals in their family contexts, with enough information on each individual to compute taxes paid to and cash transfers received from government.

- The SPSM is a static accounting model which processes each individual and family on the SPSD, calculates taxes and transfers using algorithms that simulate legislated or proposed programs, and reports on the results. A sophisticated software environment gives the user a high degree of control over the inputs and outputs to the model and allows the user to modify existing programs or to examine proposals for entirely new programs. Within the SPSM there are two models, configured as two distinct computer programs.

    - The central program, the SPSM, is a microsimulation model which calculates taxes and transfers for individuals and families. These calculations are performed for everyone on the SPSD and then aggregated to obtain estimates. The SPSM is a static impact model and is therefore not intended to simulate how an individual's behavior is likely to change in response to various policy options. The SPSM program includes software which allows the user to perform tabulation and database retrieval operations on the database information.

    - The commodity tax model (COMTAX), is a macro-economic Input/Output based model. This model is not currently released with the SPSD/M package but rather the results from it are. COMTAX provides estimates of effective federal and provincial retail sales-tax-equivalent commodity tax rates by province, household expenditure category, and tax type. This model is required because many commodity taxes are levied at intermediate stages of production, not at the final retail stage. Rates calculated by the COMTAX model can be input as parameters into the SPSM to obtain estimates of the commodity taxes paid, both directly and indirectly, by any given household.

- The data retrieval and reporting software are configured as facilities accessed through the model. They allow the user to produce formatted output and to perform specific kinds of analysis.

- The user documentation is extensive and comprehensive. It is divided into three manuals with a number of guides in each.

CAPABILITIES AND FEATURES

The SPSD/M algorithms operate on a database created using survey and administrative data from 1996. The SPSD/M comes with the necessary algorithms and parameters to simulate the tax/transfer systems in that year. The SPSD/M also performs projections to all other years from 1984 through 2003. The following is a list of the major programs which can be simulated with the SPSM. Users can add their own algorithms to this set.

Personal Income Taxes

- 1984 to 2003 taxation year algorithms
- Major deduction items
- Payroll deductions (CPP/QPP, UI contributions).
- Provincial tax algorithms.

Cash Transfers

- Unemployment Insurance Benefits/Employment Insurance
  Detailed treatment of eligibility and benefits by:
  - type (regular, maternity, fishing, sickness, retirement) and
  - phase (regular, labour force extended, regional extended).
- Old Age Security benefits including partial benefits
- Proposed Federal Senior's Benefit
- Guaranteed income supplement benefits including partial benefits
- Six provincial GIS supplement programs
- Family Allowance benefits (federal and provincial)
- Child Tax Credit
- Federal Child Benefit
- Sales Tax Credit

Commodity Tax Model

- Twelve different tax types accounted for including:
  - Federal Import Duties
  - Federal Manufacturer's Sales Tax
  - Provincial profits on liquor commissions
  - Federal Fuel Taxes
  - Provincial Fuel Taxes
  - Provincial Retail Sales Taxes
- Cascading effects between taxes
- Determination of household expenditures net of implicit commodity taxes

The SPSM is written in the C++ programming language. Changes to the tax/transfer model algorithms can be made in two distinct ways: the "black box" or the "glass box" mode. The majority of SPSM analyses operates in "black box" mode.

- When using the model in the **black box** mode, a user would specify changes to one or more of the over 800 tax/transfer parameters during a user-friendly dialogue. In this mode the user can change levels and rates affecting various benefits, taxes, and eligibility requirements, and can also specify a sub-population that will be modeled.

- The **glass box** mode is designed for use by persons who wish to develop entirely new algorithms or to change existing algorithms. Glass box users can write a new (or modify an existing) algorithm in the C++ programming language, and then recompile the system using a simple one word command. The new system may then be used in black box mode. The user need not be a C++

language expert in order to use glass box mode, but should be experienced with some high level computer language.

The 1996 SPSD/M may be projected to represent a variety of different years using a method of static aging. A set of **database adjustment algorithms** and alternate weight files are included with the model to this end. The algorithms allow the user to "grow" or project the value of the money items on the base year database to some future year. The user can specify a series of growth rates which are then applied by the model. In most cases a single scaling factor is applied. However, for certain important or complex variables more complicated rates are applied. For example, employment earnings are "grown" by rates specific to province and sex of the individual. These algorithms can be used independently of or in conjunction with annual demographic weight files included as part of the database.

Users may add their own adjustment routines to augment or even replace the supplied adjustment algorithms. For example, if users wish to grow employment income at rates differing by age and sex, they could set the existing employment income scaling parameters to one and create a new income scaling algorithm.

SOFTWARE AND FACILITIES

The SPSD/M comes with a powerful software support environment designed to enhance the range, speed and ease of policy analysis in both black box and glass box modes. The comprehensive and flexible set of reporting options allow for detailed examination and verification of the database, algorithms and results. The software has been designed to work in an integrated fashion at different levels of analysis (e.g. household, census family, individual).

A user-friendly dialogue guides the analyst through all the required and optional adjustments of the parameter files. An on-line help facility provides information on the use of the model dialogue as well as a handy reference to parameter lists. Some highlights of the model are:

- The **user expression facility** allows the user to create, name, and access in subsequent runs, new variables that can be used for reporting purposes, without the need for any C++ language programming.

- The **generalized record selection facility** allows the user to specify a database subset in terms of any combination of database or modeled variables. For example, a user could create a condition with an alternate definition of income and then select all economic families with less than a specified amount of that income.

- **Marginal tax rate analyses** can be performed in a single run of the model.

- **Two distinct tax/transfer systems can be run simultaneously.** The two systems can be compared using any combination of variables in the same run. Base and variant runs may be differentiated on the basis of parameter inputs,

alternate algorithms (glass box), or both. Additionally, through the use of auxiliary input databases, users may compare the results of any number of different simulation scenarios in a single execution of the SPSM.

- A comprehensive set of **default tables** includes dollar amount and persons reporting for over 40 variables with breakdowns by province, income class, family type, and proportion above or below specified income levels by family size and type.

- A **cross tabulation facility** allows the user to specify custom N-dimensional tables using database, model, or user-defined variables. The user is given full control over output formats, precision, level of analysis, and labeling of the tables.

- **Output interface facilities** allow the user to create custom files in compressed binary format, any of three ASCII file formats, or as a native SAS file. These files are intended for subsequent analysis using the SPSM or other software packages and can contain any combination of database or modeled variables.

- **Performance** has been given high priority in the design of the SPSM but still varies greatly depending on the hardware environment, the simulation request, and the types of output specified. The SPSD/M modeling environment requires a Windows 95/98/NT compatible computer. A full model run can be performed in under thirty seconds with a Pentium III system. The SPSM can be run in batch mode to allow a series of simulations to run unattended.

We have tried to make the documentation as clear and concise as possible, and the software has been extensively tested. Still errors are possible. If you encounter any problems with the software or documentation, contact Statistics Canada directly at (613) 951-3774.

Quick Start

The SPSM can be very simple to operate and can give fast results. A basic understanding of the MS-DOS operating environment and the SPSM structure is all that is required. It should be kept in mind, however, that the SPSM is also a highly complex tool. The multi-level database and numerous parameters and facilities give great flexibility but can lead to confusion if many simultaneous changes are attempted. For this reason, the SPSM makes extensive use of default parameter files and built-in documentation features. The user can always begin from the 1996 defaults, alter various settings, and examine the results.

The supplied SPSD/M 1996 default parameter files are configured to simulate the 1996 legislated tax/transfer system while producing one default table. After first briefly examining operating system considerations and SPSM structure, this section will describe how to make a program run using these default files. The section concludes with an examination of the output and a general discussion of how to view

your results.

OPERATING SYSTEM CONSIDERATIONS

All SPSD/M files are maintained using a directory structure that follows certain conventions. Under Windows NT 4.0 and Windows 95/98, directories are referred to as folders. Users are strongly urged to organize their work in directories as well. Directories provide a structure for organizing files on disk. If you are unfamiliar with the hierarchical file system, the figure on the following page provides a brief introduction. If you are still unclear, please refer to the operating manual which came with your computer.

Executable files have either a `.exe`, `.com`, or `.bat` extension. They are executed by simply typing the file name (without the extension), followed by a carriage return at the MS-DOS prompt (C:>, if your default disk drive is your hard disk - which it should be). The `spsm.exe` program is an example of such a file. The full pathname of the executable SPSM program is `\spsm\win32\spsm.exe`.

During the user dialogue several specifications of input and output files are required. If the user does not specify a full pathname when specifying a file, the file will be read from, or written to, the current directory. The following figure shows the SPSD/M Demonstration package directory structure and selected file contents, together with a user created directory.

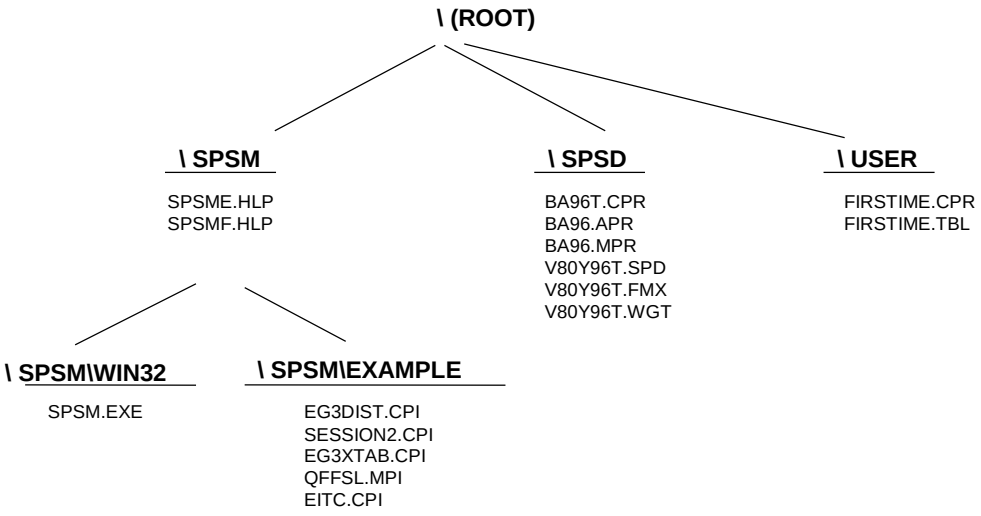


Figure 1. SPSD/M Directory Structure and Selected File Contents

When about to begin an analysis using the SPSM, the user should create a new directory to store all the input parameter files and outputs. Any name may be selected for this directory. In Figure 1, the `\user` directory is assumed to have been created for this purpose using the MS-DOS `mkdir` command. Directories containing large numbers of files are difficult to organize and impair MS-DOS efficiency. A further level of sub-directories is recommended if the analysis requires many files.

An Overview of Selected Features of MS-DOS

MS-DOS is an operating system that controls your computer and the devices connected to it. When you use your computer you are using and/or creating files of related data. These files are then managed using MS-DOS.

Files

A file is a collection of stored information. Because you can store many files on disk, naming files is an important task. Good filenames are descriptive and are composed of between one and eight characters. Spaces may not be used in filenames (check your MS-DOS manual if you are unsure of the valid characters). A filename may also have an extension, although one is not required. An extension always begins with a period followed by a maximum of three characters. The extension allows you to group files into categories by giving more information about what is in the file.

Directories

Because fixed drives can store so many files you need a method of organizing files so you can efficiently store and retrieve data. When working with MS-DOS files, a directory is used to organize groups of related files. First you determine how your files are related and then you create a directory and add your files to it. Directories are stored on the disk with the files. Directory names must follow the same conventions as filenames.

MS-DOS uses a hierarchical system called tree structuring that allows you to arrange files in directories. First you group related files into a directory then group directories into a multilevel structure called a TREE. This structure is easy to visualize if you think of the main directory as the root, the subdirectories as branches and the individual files as leaves. Subdirectories can contain data files or other subdirectories. The tree `grows' as other directories are added. For an example please refer to the figure showing the SPSM directory structure. Note that the conventional notation starts with the tree root at the top with the branches `growing' downwards.

The root directory, or simply, the root, is the main directory on a hard or floppy disk. MS-DOS creates the root directory each time it formats a disk. The root directory cannot be deleted. A subdirectory is a directory which is below, and included in, another directory. It is any directory other than the root. The current directory is the directory in which you are currently working. The current directory is the directory which MS-DOS accesses when you specify a file without specifying a directory.

When you turn the computer on, the root directory is the current directory until you change to another directory using the MS-DOS CHDIR command. A parent directory is the directory one level above the current directory in the tree-structured hierarchy.

Pathnames

Before MS-DOS can find a file in a directory that is not in the current directory you must tell MS-DOS where to locate it. You do this by specifying a pathname. A pathname consists of a drive specifier, a series of directory names, and a filename. A backslash separates each of the elements. For example the following pathname specifies that the file README.TXT is located in disk drive D: in the directory SOFTWARE which has the parent directory USERS. The root is always indicated by a single backslash.

```
D:\USERS\SOFTWARE\README.TXT
```

Using Directories

MS-DOS uses several commands to list, create, locate, change and delete directories. The key actions are to create, delete and change directories.

Command	Short Form	Purpose
MKDIR	MD	Add a new directory to the tree structure
RMDIR	RD	Remove a directory from the tree structure
CHDIR	CD	Display the current directory or change the current directory

All these commands take as their argument a directory name. For example, MKDIR \USERS will create a directory called USERS one level below the root. The command CHDIR \USERS will make \USERS the current directory. If you wish to display the name of the current directory simply enter the CHDIR command with no arguments. The command RMDIR \USERS would then delete the USERS directory. Note that you cannot delete the root or the current directory. The RMDIR command will not remove a subdirectory that contains files or other subdirectories; thus users must delete any contained files before removing a subdirectory.

SPSM STRUCTURE

As already mentioned, the SPSD/M models are configured as two distinct executable computer programs. The central program, SPSM, calculates personal income taxes, sales taxes, and government cash transfers. The other program, COMTAX, executes the macro-economic commodity tax model that provides parameters for input to the SPSM. The COMTAX program is not available on the demonstration disk or the full package and its execution is not discussed here. However, results from it are incorporated into parameter files in the form of effective retail sales tax equivalent rates. Default SPSM files apply these parameters to household expenditures to estimate individual commodity taxes.

Any execution of the SPSM program has the following basic structure.

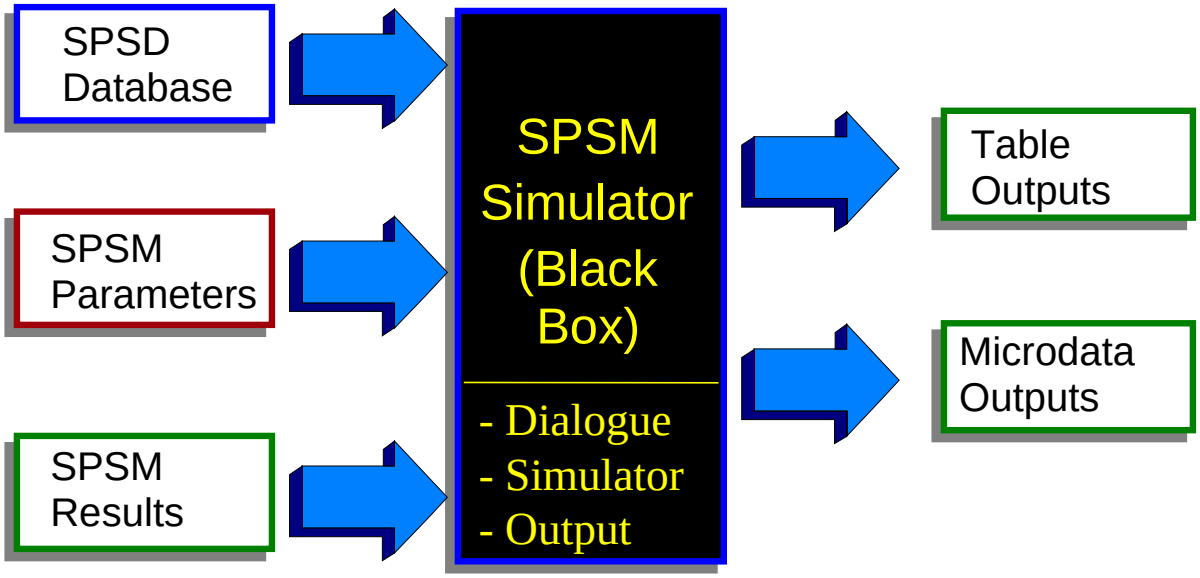


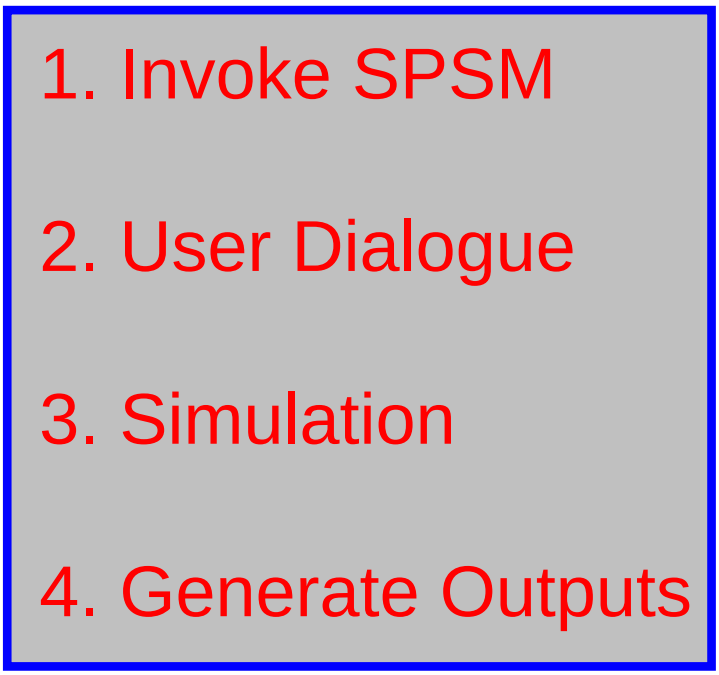
Figure 2. SPSM Program Run Structure

Microdata on individuals and households as well as parameters are specified inputs to the SPSM. (Optionally, results from a previous SPSM run may also be input into subsequent runs). The SPSM then performs the simulation, calculates results, and outputs reports and data files.

The SPSM is driven by over 800 parameters that control three main processes. **Control parameters** specify input and output files for a specific model run and are used to activate model software facilities. **Database adjustment parameters** control the growth of database money items. **Tax/transfer parameters** control the specific functioning of the tax and transfer programs.

The SPSM creates a set of output files that the user has specified. Some of these files may then be printed or examined with a full screen editor, while others contain microdata for further analysis using the SPSM or some other software package.

Any SPSM program run consists of the following four basic steps:



Brief descriptions of these steps are given below.

1. The SPSM is contained in an executable file called spsm.exe in the \spsm\win32 directory. The SPSM is started, or invoked, by typing SPSM followed by a carriage return (enter) in response to an MS-DOS prompt.

2. The user dialogue session is the first step in an SPSM program run. It provides an interactive method for changing and examining parameter file contents. The dialogue proceeds in three stages that correspond to the three types of parameter files. Control parameters are edited first, followed by database adjustment parameters, and finally by tax/transfer parameters.

3. Once the user dialogue is complete and a full set of parameters has been provided, the user no longer interacts with the program and the simulation phase begins. In this phase the database is read, records are screened, and tax/transfer calculations are made based on the specified parameter settings.

4. When the simulation is complete SPSM generates the specified output files. SPSM results are always written to files rather than being displayed directly on the screen.

EXAMPLE SIMULATION

We are now ready to try the first simulation. The complete dialogue for producing the program run is given below. Inputs that the user typed have been shown in bold followed by the ENTER key. Lines are numbered in square brackets for reference in the text. If you are unsure whether the MS-DOS environment variables are set correctly just type the following three lines in response to the MS-DOS prompt (where `c:` refers to the disk drive where the SPSD/M resides).

```
set PATH=c:\spsm\win32
set SPSM=c:\spsm
set SPSD=c:\spsd
```

The user should first create a separate directory for this test session by typing MKDIR `\user` [1]. If you already have a directory or a file with this name you will have to pick another name. Next, the user should make the new directory the current directory [2].

```
[1]          C:\> MKDIR \user  ENTER
[2]          C:\> CD \user  ENTER
[3]          C:\USER> spsm  ENTER
```

The SPSM is now invoked by typing `spsm` [3]. A copyright message will be temporarily displayed, followed by the SPSM start-up screen as shown on the following page. If this is not the case refer to the ***Installation Guide*** for possible problems and solutions.

```
                        Welcome to the Statistics Canada

                    Social Policy Simulation Database / Model
                                  ( SPSD / M )
                       Program Version                 : 8.0
                    Database Adjustment Algorithm   : Standard
                Standard Tax/Transfer Algorithm : Version 8.0: 84-03
                    Alternate Tax/Transfer Algorithm: none/aucun
                 Compiler / Operating System     : MSC 12.0 / WIN/NT

                          Copyright (c) Minister of Industry
                                     1984 - 2000

[4]      Press 'F1' for context-specific help.
[5]      Press Ctrl-Break to terminate.
==================== Control Parameters ======================
[6]      Enter name of input control parameter file ==> \spsd\ba92t
         Loading control parameters from '\spsd\ba92t.cpr'

[7]      Enter specification for generating output files ==> firstime
         Generating default output file names.
```

The information on the start-up screen (after the copyright) can be safely ignored until the user makes glass box changes. The help facility is easily accessed [4] and the user can break out of the program [5] at any time.

In the first phase of the dialogue, the user creates or modifies a control parameter file. The user must provide a valid control parameter filename in response to the first prompt. In this example the default control parameter file for the 1992 tax/transfer system is specified with its full pathname [6]. Note that the default file extension of `.cpr` can be omitted if desired.

The second prompt requests a name to use when creating filenames for output from this run [7]. If the user does not specify a response to this prompt SPSM will create output file names based on the full pathname of the input filename specified in [6]. In this example we will use the name "firstime".

After the user has responded to these two prompts the SPSM finds the specified control parameter file and displays some of its key contents as follows:

```
[8]  Current values of selected control parameters:
     Descriptive
        CPRDESC    Tax/transfer:1992 Population:1992 Incomes:1992 (1992$) [5%]
        LICENSEE   Statistics Canada  # SPSD/M licensee
     Selection/Sample
        SELFLAG           0           # Selection facility activation flag
        SAMPLEREQ   1.000000000       # Size of sample requested
     Input Databases
        INPSPD     $SPSD/v80y96t.spd  # Name of SPSD file (in)
        INPFXV     $SPSD/v80y96t.fxv  # Name of FAMEX vector file (in)
        INPWGT     $SPSD/v80y92t.wgt  # Name of weight file (in)
     Growth
        INPAPR     $SPSD/ba96_92.apr  # Name of database adjustment parameter file
     Scenario Control <no base, variant computed using parms>
        BASMETH           0           # Method of creating base variables
        VARMETH           2           # Method of creating variant variables
        INPVARMPR  $SPSD/ba92.mpr     # Name of variant tax/transfer parameter file
      Output Files
      OUTMRSFLAG        0           # Variant results file creation flag
      OUTCPR     firstime.cpr       # Name of control parameter file (out)
```

For now this information can be ignored as we are not interested in changing any of the default settings. However users are reminded that we are requesting a 100% sample of the SPSD/M 5% sample database [8].

```
[9]   Do you wish to modify any control parameters ? ==> n
      No files will be overwritten with these control parameters
[10]  Any further control parameter changes ? ==> n
      Writing out control parameters to 'firstime.cpr'
```

To use the default files, or files prepared previously with a text editor, no changes are required using the dialogue manager [9]. A no response to the next prompt [10] then causes the dialogue to proceed to the next phase.

```
      ================ Database Adjustment Parameters =================
[11]   Loading database adjustment parameters from '$SPSD/ba96_92.apr'
       Current values of selected database adjustment parameters:
        GFISENF       10                 # Growth Factor: Self-employed income - non
           0.87580
           0.96300
           0.92010
           0.84940
           0.91630
           0.87010
           0.87730
           0.82230
           0.91340
           0.91060
       GFIEMP        10        # Growth Factors: Employment income
         0.94650  0.94650
           0.93010  0.93010
           1.04530  1.04530
           0.96480  0.96480
           0.98370  0.98370
           0.98810  0.98810
           1.01400  1.01400
           0.94660  0.94660
           0.98180  0.98180
           0.97890  0.97890
[12]   Do you wish to modify any database adjustment parameters ? ==> n
```

The name of the file containing the database adjustment parameters which will be loaded has previously been specified in the control parameter file. Adjustment parameters are always applied. In this case (i.e. in file `\spsd\ba96_92.apr`) all growth factors have been set to 1 [11] and effectively the database is not altered. Because we wish to use these defaults we will respond 'n' to the prompt [12].

```
       ====================== Tax/Transfer Parameters ====================
       Loading variant tax/transfer parameters from '$SPSD/ba92.mpr'
       Current values of selected variant tax/transfer parameters:
        MPRDESC      Current values for 1992
[13]   CTFLAG              1             # Commodity tax activation flag
        CTOPT               2             # Commodity tax calculation method
        CTDFLAG             0             # Commodity tax detailed calculation flag
[14]   TARGETYEAR        1992             # Year of analysis
        PEROPT              2             # Personal exemption/credit option
        QREFOPT             2             # Quebec deduction/credit option
       Do you wish to modify any variant tax/transfer parameters ? ==> n
       ============================ Execution ==========================
        SPSM          started   on Tue Jun 13 13:08:48 2000
[15]    SPSM          completed on Tue Jun 13 13:08:49 2000
        Elapsed time= 00:00:01
        Number of households processed=  3551
        Number of persons     selected= 10353
        Variant consumable income ($000,000):   346162.1
        Control parameter file . . . . . . . . firstime.cpr
        Table output file  . . . . . . . . . . firstime.tbl
```

The default tax/transfer parameters are read as specified in the control parameter file. Sales taxes will be calculated [13] as the flag for commodity taxes has been set to 1 by default. Because we wish to examine results using the 1992 tax/transfer system, no parameter changes will be made [14]. Control is then passed back to SPSM for completion of the simulation.

The numbers seen below the "SPSM started" row represent the estimated percent of the run completed, and are covered over with symbols as the run progresses.[15].

If at any time the user wishes to stop or pause execution and examine some key results as calculated so far, he or she should press CTRL-BREAK (press the BREAK key while holding down the CTRL key). The program will pause its computations, display current totals, and prompt the user whether to continue or not. If the user decides to stop partway through the execution, output files are immediately written and control parameter files are altered to reflect the portion of the database actually read.

The program always ends with some key information on the run including a list of all output files.

EXAMINING OUTPUT

As mentioned earlier, all output from the SPSM is written to files. Some of these files are designed to be read by other computer programs. Others are meant to be examined either on the screen or on paper. There are various ways to do this. The simplest way is to display the results on the screen using the MS-DOS `type` command (eg. type `firstime.tbl`). Another way is to send the file to a printer using the MS-DOS `print` or `copy` command. The problem, of course, is that the text will scroll off the screen if it is more than 23 lines long and it will wrap around if it is more than 80 characters wide. Since many default tables are 132 characters wide, a printer must either have wide paper or use a condensed font.

A text editor provides a good means for viewing output because the user can then easily scroll back and forth between the desired portion of the output. By importing a file into a spreadsheet the user can not only move around the output easily, but can also perform subsequent calculations on the results. This technique is used in the spreadsheet interface facilities described in the *Tools User's Guide*.

The following is a listing of the output produced in our sample run above. The output is found in the file named `"FIRSTIME.TBL"`. This is only the first of ten possible default tables and is called `"Table 0"`. The format and contents of this table are fixed. Users may not change either the rows or the columns of the table. Some descriptive notes have been included to the right of the table.

```
                    SPSD/M (Database 8.00)
       Base Description: No base results
    Variant Description: Current values for 1992   [Driver: Version 8.0: 84-03,
File: $SPSD/ba92.mpr]
           Sample: 0.0505  AGENAME='Standard'
               Table 0: Results for Census Families
```

Variable (x1,000,000)	TOTAL	
Family Units (x1000)	12102.3	12.1 Million Census families
Persons (x1000)	29296.8	29.3 Million Canadians
SCF Survey Records	2007.0	
SPSD Records	3862.0	
Income (Base)	346162.1	
Income (Variant)	346162.1	$346 Billion in `Consumable' Income
Change	0.0	(Total income less income and
Number of Gainers (x1000)	0.0	commodity taxes)
Number of Losers (x1000)	0.0	
No Change (x1000)	12102.3	Only one tax transfer scenario run
Gainer's Gain	0.0	
Loser's Loss	0.0	
Total Income	492145.7	
Market Income	412244.6	
Wages and Salaries	321245.9	
Self-Employment Income	28087.6	
Investment Income	33900.1	
Other Income	29011.1	
Transfer Income	79901.0	
Total Tax	145983.4	
Net Transfers	-66082.4	Transfers less taxes
Disposable Income	388681.8	Total income less taxes
Consumable Income	346162.1	Disposable income less commodity taxes
Federal Taxes	91563.4	
Federal Income Tax	54891.2	
UIC Contributions	7756.5	
UI Benefit Recovery	74.2	
CPP/QPP Contributions	5759.9	
Other Recoveries	811.3	
Federal Commodity Taxes	22270.3	
Federal Transfers	69247.5	
Senior Benefit	0.0	
Federal Family Allow.	3489.6	$3.5 billion in Federal Family Allowances
CTC / Child Benefits	2781.7	Total Entitlement, not just refundable portion
OAS	12593.1	
GIS	3538.0	
SPA	429.8	
UI Benefits	17280.8	
CAP (Federal Portion)	4771.7	
CPP/QPP Income	15663.0	
Other Federal Transfers	5862.2	
Sales Tax Credit	2837.4	
Que. Tax Abatement ref.	0.2	
Federal Net Balance	22315.8	Federal taxes less transfers explicitly
Provincial Taxes	54420.0	analyzed
Provincial Income Tax	34171.0	
Provincial Commodity Tax	20249.0	
Provincial Transfers	10653.5	
Family Programs	479.9	
Elderly Programs	507.5	
CAP (Provincial Portion)	8130.7	
Tax Credits & oth Trans.	1535.4	
Provincial Net Balance	43766.5	Provincial taxes less transfers explicitly analyzed

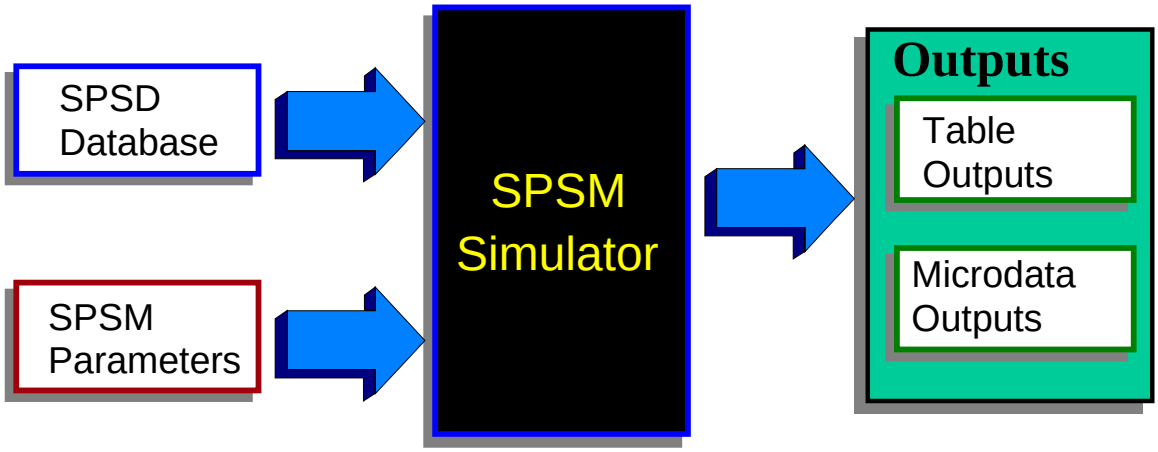
Understanding Basic Components

Having performed a complete SPSM run, we leave aside for the moment the specifics of performing a program run and turn our attention to the several key components that form the basis of the model and any given simulation.

At a very general level, the SPSM accepts as input a set of database variables and applies various algorithms to them which in turn produce a set of simulated variables. The database and simulated variables are then output in different forms for analysis. The entire process is controlled by parameters. Any complete simulation involves all of the following four components.

- Database
- Parameters
- Simulation
- Outputs

Each of these four components must be understood on its own as well as in terms of its relationship to the other components as shown broadly below.



This section describes the function and most important features of each of these four components. It also describes the ways that these components interact with each other.

The SPSD database forms the foundation for the entire SPSD/M and is discussed first in terms of its scope, organization, structure, and variables. The simulator performs all operations on the database including adjustment and screening, simulation of modeled variables, and reporting results. The parameters that control this process are discussed next. This is followed by a general discussion of the outputs available from the SPSM. The section concludes with an examination of the SPSD/M files and their relationship to the components just discussed.

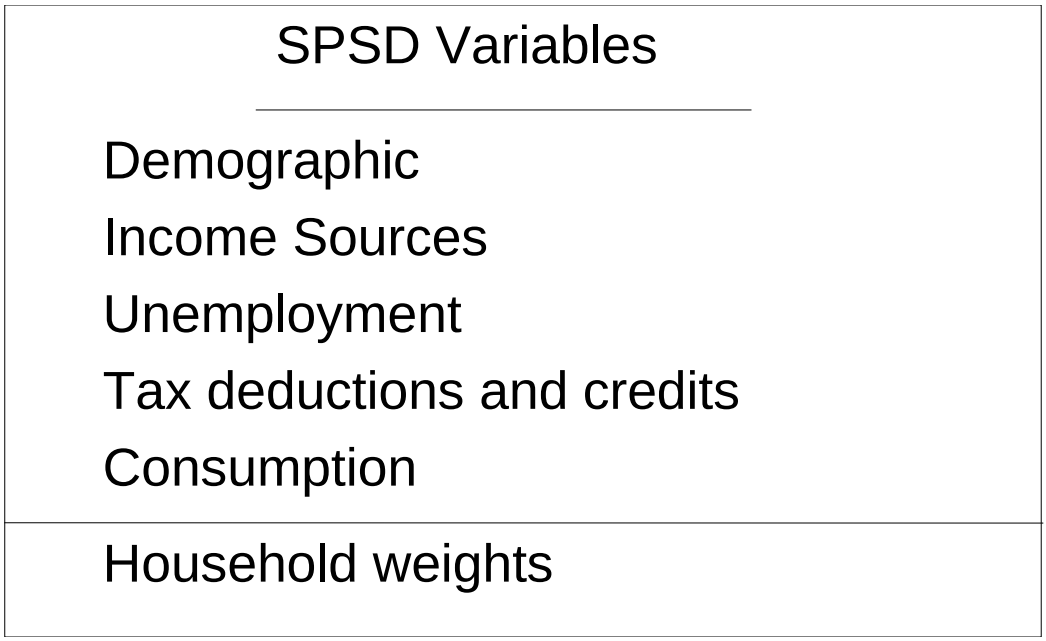
DATABASE

The SPSD was constructed by combining individual administrative data from personal income tax returns and unemployment insurance claimant histories with survey data on family incomes and on expenditure patterns. The techniques used to create the database and avoid confidential data disclosure include various forms of categorical matching and stochastic imputation. While no one record on the database contains information for the same individual from the four bases, the database has been constructed in such a way as to provide a micro-statistically representative sample of Canadians.

The SPSD can be used to represent the population of Canada commencing in 1984. This is done through the use of different sets of household weights that embody demographic data and projections by age, sex and province for years beyond 1996.

Certain adjustments have been made in SPSD to force agreement between data and known control totals. For example, survey weights have been adjusted to ensure that the population by age and sex corresponds to census estimates, and the number of high income Canadians corresponds to the number reported by Revenue Canada. Further adjustments have been made to compensate for item non-response in the surveys (e.g. to increase the number of families receiving social assistance). It should be noted that the SPSD coverage does not extend to the Yukon or Northwest Territories, persons residing on reservations, or armed forces personnel residing in barracks.

The richness and complexity of the database permit comprehensive simulations but require some degree of familiarity if the data are to be processed correctly and valid conclusions drawn. The fundamental family structure of the data as well as the organization and range of variables and their sources are briefly presented here. For a full discussion of the variables and database consult both the *Variable Guide* and the *Database Creation Guide* in the *Reference Manual.* A listing and brief description of the six major types of database variables follows.



SPSD Variable Types

Demographic Variables

Demographic variables include age, sex, province, and family structure. A number of other classification variables, such as industry, occupation, educational status, labour force characteristics and housing tenure are also present. These variables are taken from the Survey of Consumer Finance/Labour Force Survey (SCF) of about 40,000 households.

Income Variables

A number of variables giving individual income (for persons aged 15 years or older) by source are present. Sources include employment income, self-employment income, dividends, interest, and capital gains. These variables are drawn from the SCF except for high income individuals where they are derived from personal income tax information.

UI/EI (Unemployment Insurance/Employment Insurance) Variables

Variables providing some detail on the structure of up to two UI claims for each individual in receipt of UI on the SPSD are given. Included are data related to the start date of a claim, the type of claim, and weeks on UI in the various phases (e.g. Regional Extended Benefits). Variables come from matching EFC UI claimants with a 10% random sample (about 400,000 records in the base year) of Human Resources Development Canada administrative data files on individuals in receipt of UI/EI.

Tax-related Variables

To complete a tax form, one requires certain individual non-income variables. These include RRSP contributions, tuition fees, medical expenses, and charitable donations. These variables come from a stratified sample of approximately 350,000 Revenue Canada T1 individual income tax returns (the same sample that underlies Revenue Canada's annual Green Book publication).

Consumption Pattern Variables

Each household on the SPSD has an associated expenditure pattern, giving household expenditures by 48 distinct types of commodity. The Family Expenditure Survey (FAMEX) collects this detailed information on expenditure patterns on about 10,000 households.

Household Weights

Household weights are stored on separate files. There is a series of nine sets of weight files corresponding to population estimates for the years from 1984 to 1997.

The database variables mentioned above have been arranged into fourteen distinct groups. A full list of the available variables ordered by group is given at the end of this guide as well as in the ***Variable Guide***.

Level of Analysis

The tax/transfer system considers the family context of individuals in determining the value of many taxes and benefits. For example, child tax credits depend on the presence of children and the amount of family income. The SPSM processes households and reports results based on several different social units.

The SPSD is a hierarchical family file in which the family relationships among all the members of a household are known. The phrase "a level of analysis" refers to one of five hierarchically arranged types of "families". The individual is the smallest and a household is the largest. The SPSM five family levels of analysis are defined as follows:

Individual	Single person or record on the SPSD.
Nuclear family	A head, spouse if present, and never-married children under the age of 18 sharing the same dwelling.
Census Family	A head, spouse if present, and never-married children of any age sharing the same dwelling.
Economic Family	A group of individuals living together who are all related by blood, marriage, or adoption and share the same dwelling.
Household	Any individuals or group of individuals who share the same dwelling.

Note that unattached individuals are considered to be special kinds of census and economic families in SPSD/M. This usage differs from most Statistics Canada publications.

The SPSD data are stored at either the individual or the household levels. For example, age and employment income are individual-level variables while province and shelter expenditures are household-level variables. The data from the individual level are aggregated to another higher specified level for reporting purposes. For example, individual disposable incomes can be aggregated to census family disposable income. Some of the information from the household level can be "passed-down" for reporting at lower levels. For example, a table on individual capital gains by province would draw on the household level province variable. All modeled variables are assigned at the individual level.

The level of analysis must be specified for the production of default tables, user-defined cross-tabulations, SAS files and text output files. A level of analysis must also be specified for the selection facility, which causes results for certain user specified units of analysis to be excluded from processing and/or results. The facility for displaying the univariate distributions of variables also makes use of a level of analysis.

The default level of analysis varies depending on the application.

Variable Types

Variables in the SPSD/M can be grouped in two broad categories. Nominal or ordinal variables whose values denote membership in distinct categories are called 'class variables' in this documentation. They may also be referred to as classificatory, categorical or classification variables. An example of a class variable is *idsex*, which records the sex of an individual. Variables which take numeric values on which arithmetic operations can be meaningfully performed are termed analysis variables. An example of an analysis variable is *idiemp*, which records the employment income of an individual.

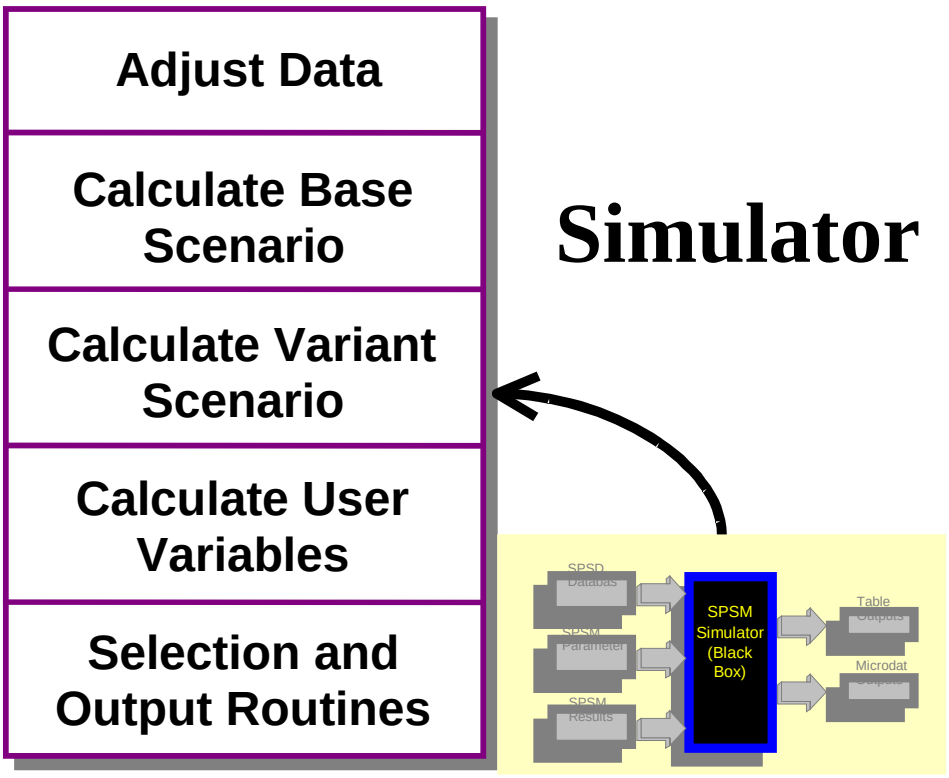
The distinction between class and analysis variables is an important one. Certain of the SPSM facilities require that either a class variable or an analysis variable be specified in certain contexts. Class variables can be converted into analysis variables, or analysis variables to class variables using the SPSM's facilities to create user-defined variables.

A further important distinction is database versus modeled variables. Database variables, as described above, represent responses to survey or administrative reports and reside on disk in the SPSD file. Modeled variables are those variables which are calculated during the actual simulation run and may also be subsequently stored in result files.

Because of the many different types of variables used by the SPSM, extensive and strict naming conventions have been adopted. For example all database variables stored at the individual level of analysis begin with the *id* prefix and all individual modeled variables begin with an *im*. Further details on naming conventions can be found in the *Variable Guide*.

SIMULATOR

The simulator is the second basic phase of an SPSM program run. Once the user has started the model and provided a complete set of parameters the simulator phase begins. The simulator phase operates in five sequential steps. Each of these steps is described briefly below.



Database Adjustment

The SPSD is based on surveys and administrative data collected for the 1996 calendar year. Adjustment of this data may be required for several reasons. The user may wish the incomes to represent the incomes in a more recent year such as 1999. In this case the user would then supply estimates of growth rates for income by source between 1984 and 1999. The user may also wish to make adjustments for simulation purposes in the 1996 year. For example, known under-reporting of alcohol expenditures may be treated by scaling each household's alcohol expenses, or a deduction item could be scaled down to zero to represent a restriction of a certain tax measure. Finally the user may wish to adjust the weights of individuals and households to reflect alternative demographic assumptions.

Prior to the calculation of any taxes or transfers each dollar denominated database variable is multiplied by a single corresponding database adjustment parameter. There are two key exceptions to this. Employment income, comprising about 70% of total income, is given more rigorous treatment due to its relative importance in the overall tax/transfer system. Employment income is therefore adjusted by industry

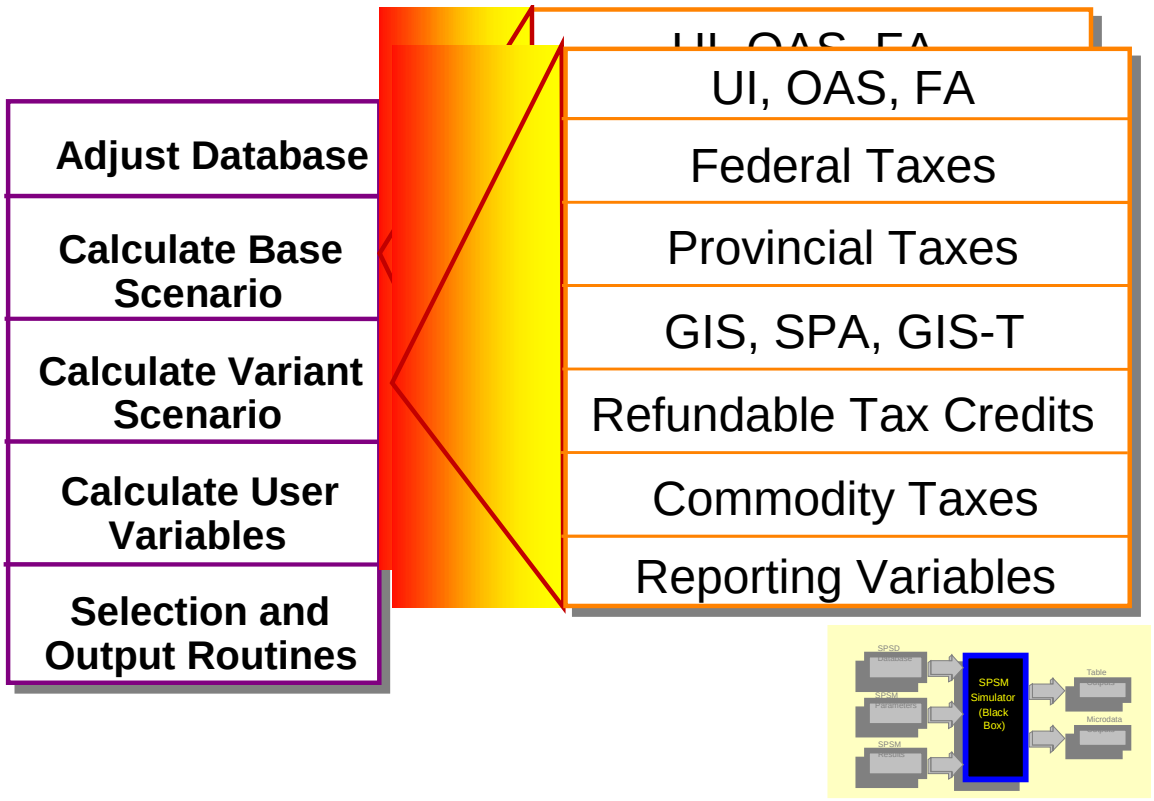
specific growth rates. CPP/QPP income is adjusted by differential rates according to age groups. This allows a simulation of the phasing in of that program. Users should refer to the *Parameter Guide* for further details on specific adjustment parameters.

Calculate Base Results and Variant Results

Microsimulation results are usually analyzed by comparing the results of one specified scenario with those of another. For example, if one was interested in examining the impact of extending Unemployment Insurance maternity benefits from 15 to 20 weeks two scenarios would have to be calculated. The first scenario would be the tax/transfer system as currently legislated, let us call it Scenario 1. The second scenario has the exact same tax/transfer system with the exception that Unemployment Insurance maternity benefits are extended to 20 weeks. Let us call this second scenario Scenario 2. This could be done by performing two separate program runs and then comparing the outputs from the runs to determine the impact. However the SPSM is capable of performing the comparison in a single program execution. This is accomplished by applying the simulation algorithms to a given household twice in the same program run but with different parameter files. One such application is called the base and produces "base" results while the second application is called the variant and produces "variant" results. The first run, Scenario 1, would be calculated using the base set of parameters while Scenario 2 would be calculated using the variant parameters.

The results of any single simulation scenario are derived by a series of functions which sequentially calculate certain taxes and cash transfers as required by the tax/transfer system. For example, family allowances must be known before calculating net income. The sequence of these functions is controlled by a program called the driver. The following figure represents the standard algorithm driver. Changes to the standard (or alternate) algorithm driver can be made in glass box mode.

The following figure shows the structure of the standard tax/transfer algorithm driver in more detail.



Tax/Transfer Algorithm Driver Structure

The first three functions simulate the Unemployment Insurance, Old Age Security and Family Allowance programs whose benefits are determined by factors outside the tax system. This is followed by the calculation of net income. The Guaranteed Income Supplement, Spouses Allowances, and social assistance are calculated next based on net income. Federal and provincial taxes are then calculated, in that order. Refundable tax credits (child tax credit and sales tax credit) and seven provincial old age income security programs are then calculated. Sales & excise taxes are calculated next by applying Input/Output based effective sales tax rates(calculated with COMTAX) to observed family expenditures and scaled to be consistent with simulated disposable income. Reporting variables for output are calculated as the last step of the driver algorithm.

Simulated variables, as opposed to database variables, are calculated either once or twice in the simulation phase. Base result variables, if requested, are calculated first, followed by variant variables. Base results, if generated at all, may be read from a file or calculated from the standard or alternate algorithm. Variant results, if generated, must be calculated from the standard or alternate algorithm (alternate algorithms may only be created in glass box mode). Base and variant results have independently specified tax/transfer algorithms and parameters. Distinct sets of result variables are maintained for both the base and variant so that the user may compare the two scenarios in terms of any combination of variables at any level of analysis.

User Variables

Although there are hundreds of variables available in the SPSD/M users will often wish to create their own variables for reporting purposes. This is done by manipulating the database and modeled variables. The user may create classification variables by specifying a continuous or discrete variable together with a set of breakpoints which define the class boundaries. Analysis variables may also be created by specifying an expression which manipulates logically and/or algebraically any of the database or modeled variables. User variables may be given names and labels as well as level labels for classification variables.

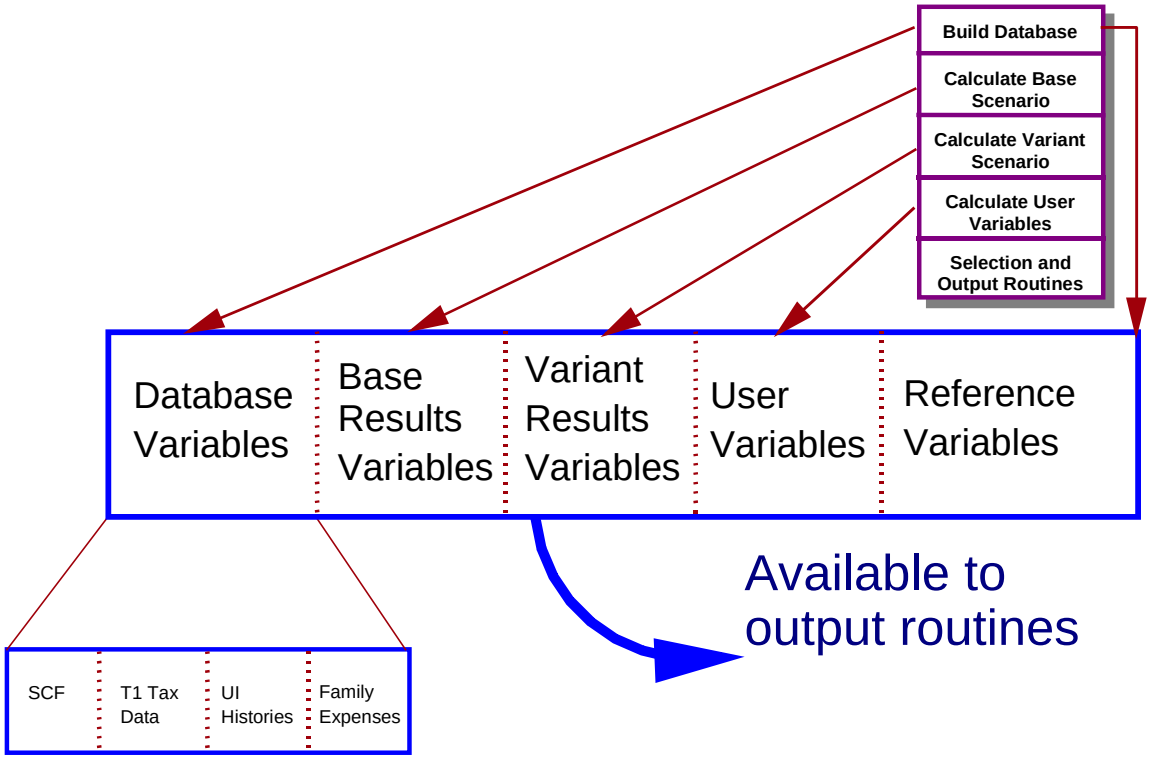
Screening Cases and Output Phase

Users may wish to restrict the calculation of results to a certain subset of households or to a certain type of individual or family on the database. This can serve both efficiency and analytical purposes. This screening can be based on modeled as well as database variables. Therefore it follows the calculation of base and variant results. For example, households having no children may be selected or individuals with no employment income excluded. Screening affects all of the SPSM output facilities in any given program run.

The output phase is the last step of the simulator and is designed to produce a series of outputs for different purposes. Output is either intended to be looked at or printed on the one hand or to be input to another computer program on the other. There are two main ways of producing printable aggregate tables, either by using one of the five supplied default tables or by creating your own customized tables. (See the user facilities section below for further details.)

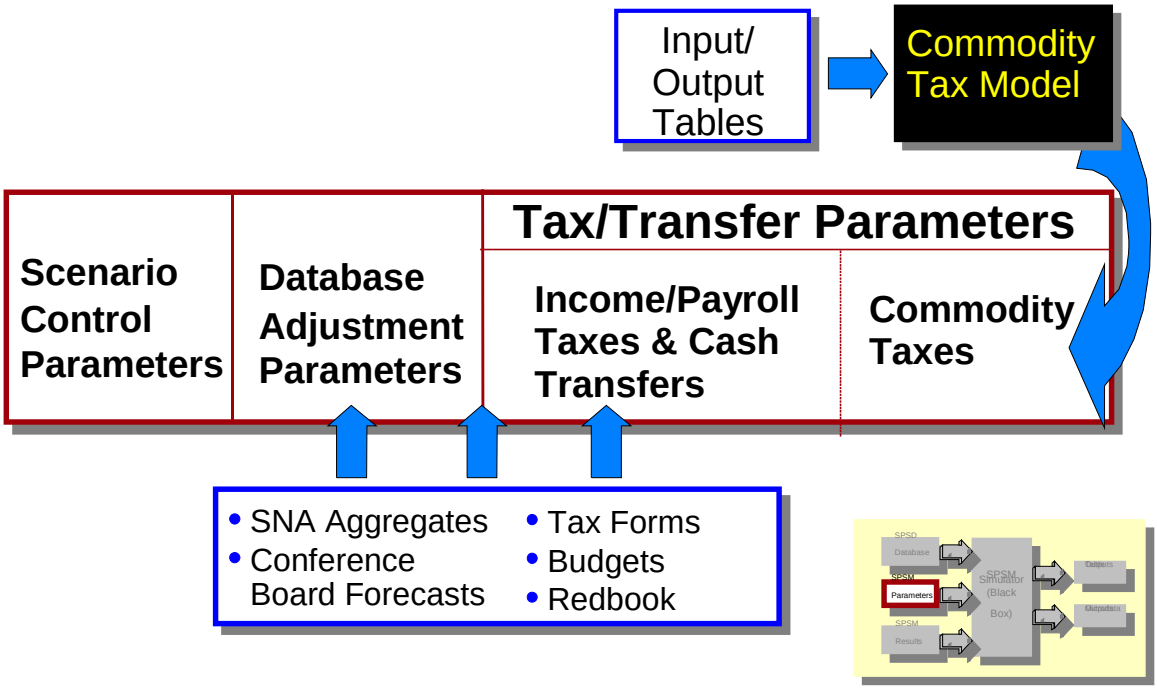
Certain techniques useful in quantitative analysis (such as regression analysis or the calculation of gini coefficients) are not incorporated into the SPSM program. The SPSD database files are stored in a compact binary format which is interpretable only by the SPSM programs. The output facility provides users the ability to create files containing subsets of the SPSD cases or variables in several different formats for subsequent data analysis using the SPSM or other software products. These formats can be read by the SPSM, SAS, spreadsheet programs, and other analytical software. Some output options also are suited to visual interpretation.

There are a large number of variables potentially available to the output routines. The diagram below indicates the broad types of variables and their relation to the SPSM simulator. The starting point is on the left with all database variables. Next, there are two possible sets of modeled variables, one for the base case and one for the variant. User variables are calculated next as a function of any of the variables created so far. Finally reference variables from previous model runs may be read and processed by the output routines.



PARAMETERS

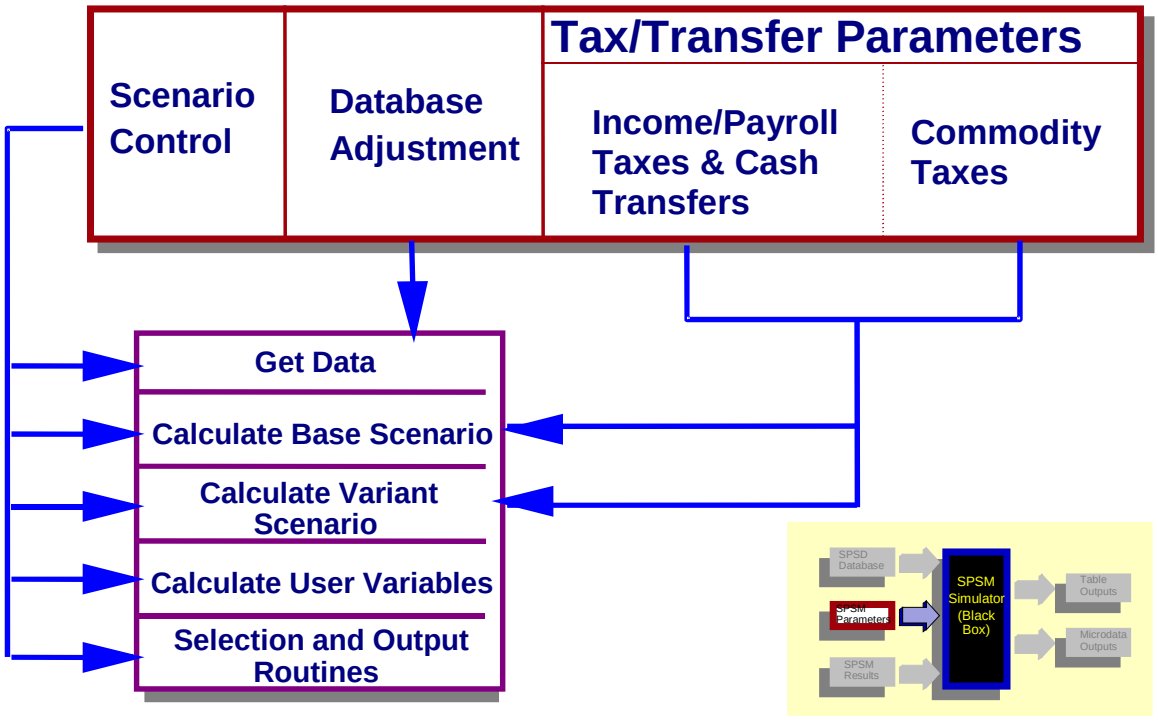
Parameters are used by the SPSM to control every aspect of a program run.



SPSM Parameter Types

As mentioned earlier, the SPSM is driven by over 800 parameters divided into three groups, corresponding to three types of files that control three main processes. **Control parameters** specify input and output files for a specific model run and are used to activate model software facilities. **Database adjustment** parameters control the inflation of database money items. **Tax/transfer** parameters control the specific functioning of the tax and transfer programs. In the case of commodity taxes, a set of default parameters is supplied.

Perusing the included lists of the tax/transfer parameters at the back of this guide can give one a feel for the scope of options available in the tax/transfer algorithms. A complete list of parameters organized by subject area can be referenced in the *Parameter Guide*. SPSM parameters provide instructions to the simulator in the following way.



The Relationship of Parameters to the Simulator

Note that control parameters affect every step of the simulation whereas database adjustment parameters are used only once. Two sets of tax/transfer algorithm parameters are specified, one for calculating base results, and one for calculating variant results. Each of the three types of parameter files are now discussed in turn.

Control Parameters

A control parameter file contains specifications for parameters used to control SPSM

general operations. It gives information for such things as input and output file specifications, record selection requests, cross-tabulation and other user facilities. It does not give information on the parameters used to specify database growth, or parameters of the tax/transfer system. This information is provided by separate parameter files. The majority of control parameters are used to control the SPSM user facilities. The control parameter file also acts as documentation for a program run because it contains all the information necessary to make the run. Control files normally have a `.cpr` extension.

Database Adjustment Parameters

Database adjustment parameters allow the values of variables on the database to be changed in order to represent dollar values in calendar years other than 1996. For example, the dividend income of each individual on the database is multiplied by the database adjustment parameter GFIDIV. In 1987 the value was 1.201 and thus all dividend income is 20.1 percent higher. Some of the database adjustment parameters are more structural in nature. For example, the parameter PTF specifies poverty income thresholds for the default tables, and the parameter UITARGYRMAX establishes maximum insurable earnings levels for unemployment insurance. If any database adjustment parameters are modified from their initial values in the database adjustment parameter files during the user dialogue, then a modified database adjustment file (with file extension of `.apr') will be generated.

The database adjustment parameters supplied with the full SPSD/M are based on differences between SPSD per capita base year (1996) figures and per capita national accounts data for available years. For years where projections must be made a simple extrapolation of the growth rate over the past two years is performed. Users may provide their own estimates if they wish to supply alternate growth rates.

Tax/Transfer Parameters

The final set of parameters is for controlling the algorithms which simulate taxes paid to and cash transfers received from government. Users provide values for the appropriate year of analysis or the particular tax/transfer scenario of interest. These parameters can switch entire programs on or off as well as specify benefit levels, reduction rates, turning points, tax tables, and so forth. If, for example, a user wished to examine the impact of increasing the tax-back rate for the child tax credit from five to ten percent and the benefit level by $10, he or she would change the values of the two tax/transfer parameters CTCRR and CTCPC.

OUTPUT FACILITY

The SPSM writes all requested simulation results to output files. There are three main purposes for which the SPSM generates outputs.

- To document parameter settings which produce a program run
- To provide case by case information on simulation results
- To provide tabular aggregate information on simulation results

Outputs which document the program run are stored in the various specified

parameter files. These parameter files are output in a self-documenting format, with parameters labelled and arranged in sections. These files may be viewed on the screen, or printed if desired. An output control parameter file is always produced. It contains, among other things, input and output files used in the run. The run can thus be duplicated using the output control parameter file in a subsequent run. Certain of the control parameters are informational and are not directly modifiable by the user. An example is ALGDESC, that displays which version of the tax/transfer algorithm was used for the standard and alternate tax/transfer algorithms. If the user has modified database adjustment parameters or tax/transfer parameters in the user dialogue an output parameter file of the appropriate type, including the specified changes, is produced.

Case by case results are useful for a number of reasons. They can be used as input to other software programs. If, for example, a user wished to calculate gini coefficients or perform a regression analysis on SPSD/M variables he or she would create a dataset containing only the variables of interest for each household (or any other level of analysis). That file would be read and processed by other analytical software with regression and sorting capabilities such as SAS, SPSS, GAUSS, etc. Case by case results can also be used as input to the SPSM to provide base result variable values. Finally, case by case output can be printed or viewed on the screen for debugging or other analytical purposes. For example, if a user wished to examine in great detail the five households who had lost the most disposable income in a comparative simulation, he or she would first isolate the household sequence numbers of the top five losers using the distributional analysis facility. A second run which would select only the five households of concern, and print out all variables for those households could then be submitted.

Aggregate results take three distinct forms; built-in tables whose format is fixed by SPSM, user-specified cross-tabulations, or the report produced by the distributional analysis facility. Tables can be printed, analyzed directly, or used as input in other software packages. Spreadsheet packages can be particularly useful for manipulating the results from aggregate tables. Please see the *Tools User's Guide* for more information on the spreadsheet interface facilities supplied with the full SPSD/M.

DISPOSABLE AND CONSUMABLE INCOME

An important distinction to keep in mind when using the SPSD/M is the difference between disposable and consumable income. The analysis of federal and provincial taxes paid by individuals and families should include commodity and sales taxes, especially as these types of taxes play a larger role in the overall tax system. The tax\transfer parameters supplied with the SPSD/M support analyses which are concerned with both income and sales tax.

Disposable income is defined in the SPSD/M as total income minus total federal and provincial income taxes. It therefore represents the amount of income an individual or family has available for spending (e.g. shelter, food, savings). Consumable income, on the other hand, is defined as disposable income less commodity taxes

embodied in household consumption. As such, it is not a post all tax concept because not all taxes are accounted for when determining consumable income. For example, municipal property taxes, and provincial land transfer taxes are not included in the calculation.

The SPSD/M built-in tables and standard reporting facilities define gainers and losers in terms of consumable income. If users wish to express their analyses in terms of disposable income two approaches are possible. First, the user can disable the calculation of commodity taxes and cause consumable income to be set equal to disposable income. Alternatively the user can specify custom tables (using the X-tab facility) which are defined in terms of disposable income.

SPSM FILES

Files are maintained using a MS-DOS directory structure which follows certain conventions. The SPSD/M uses a great number of different types of files. All SPSM executable programs are stored in the `\spsm\win32` directory. For example the full pathname of the executable SPSM program is `\spsm\win32\spsm.exe`. Database files and supplied parameter files are found in the `\spsd` directory. The use of directory structures and strict naming conventions have been used in order to avoid confusion.

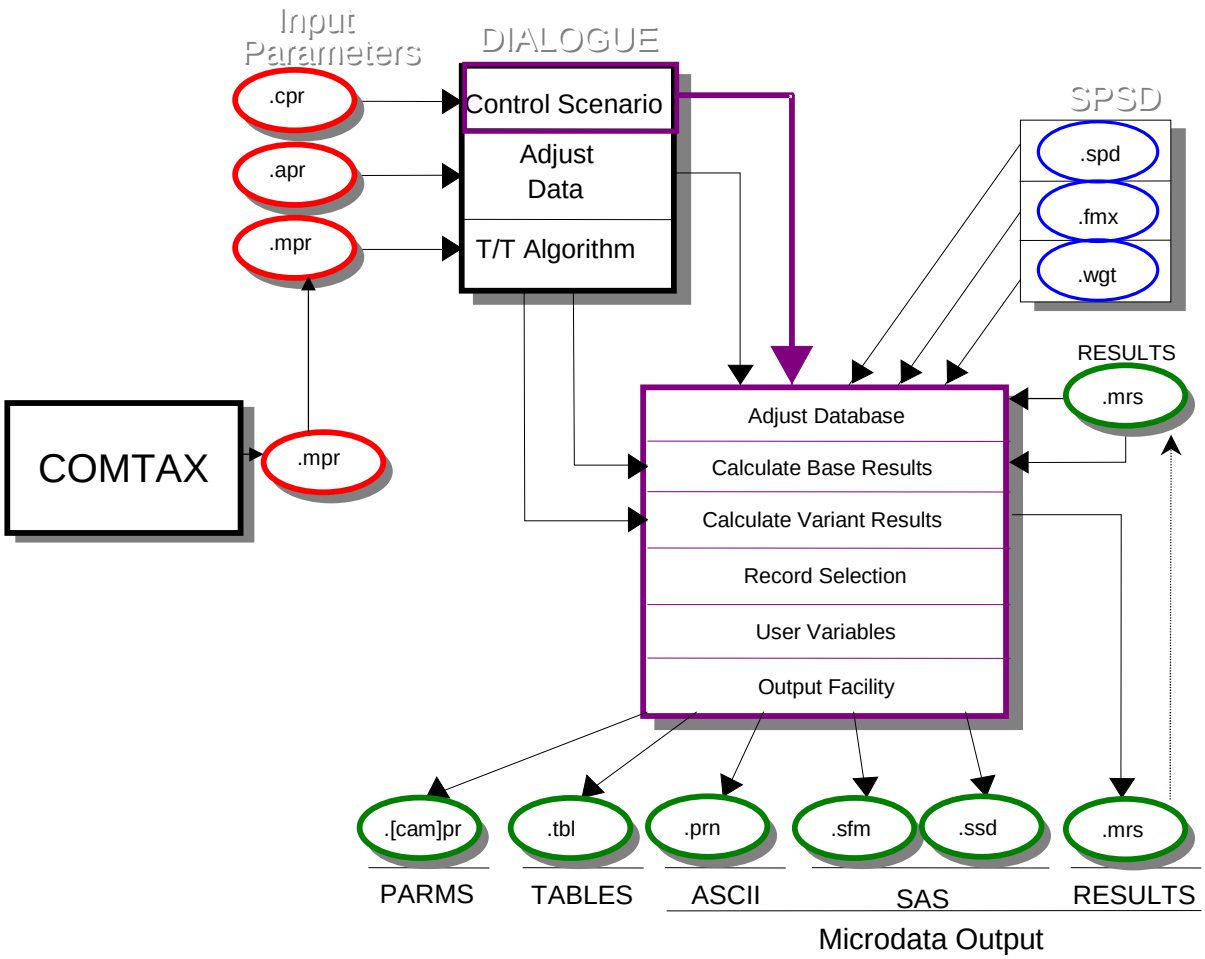
The following table gives the file extension naming conventions used for SPSM input and output files. These conventions have been developed based on a great deal of experience with the SPSM. While SPSD/M files names and extensions are not restricted in any way, the user is strongly urged to become familiar with these conventions before attempting to design some alternate system.

Database Inputs		
	.SPD	SPSD binary database file
	.FMX	FAMEX household level expenditure data
	.WGT	SPSD file containing survey weights
Parameter Inputs		
Complete and mandatory	.CPR	Control parameter file
	.APR	Database adjustment parameter File
	.MPR	Tax/transfer parameter file
Partial and optional	.CPI	Control parameter include file
	.API	Database adjustment parameter include file
	.MPI	Tax/transfer parameter include file.
SPSM Outputs		
Printable	.TBL	Output tables result file
	.PRN	Case output facility text results file
Input to further analysis	.MRS	Binary SPSM results file
	.SSD	SAS file
	.SFM	SAS formats source code output file
Program Run Control		
	.CMD	SPSM Dialogue commands

Figure 7. SPSD/M File Naming Conventions

The database files are all named by Statistics Canada and should not be changed. The parameter files with .CPR, .APR and .MPR must be complete and valid SPSM parameter files and values for all three must be specified for any given program run. The .CPI, .API, and .MPI files are created with a text editor and contain subsets of the corresponding .CPR, .APR and .MPR files which may be read in during the user dialogue. Consult the following section for a description of the four kinds of output files. A .CMD file contains a sequence of responses to SPSM prompts corresponding to an actual user dialogue. This file can then be specified as an argument when invoking SPSM. SPSM will then take input from the .CMD file rather than the keyboard.

The relationships of all these files to the structure of the SPSM is shown in the following diagram. File types with their extension are shown in ellipses.



SPSD/M Files and Relationships

This diagram can be used as a handy reference while becoming familiar with the files and naming conventions. Note that two tax/transfer parameter files are input for base and variant results calculations. Also, the SPSM results file can only be used to give base results and can only be written using the variant results. Implicit in the diagram is the output of modified database adjustment and tax transfer parameter files during the dialogue.

SPSM User Facilities

The SPSM user facilities create a powerful and flexible environment for the analysis of various tax/transfer scenarios. All of the SPSM user facilities are controlled by parameters in the control parameter file. This section describes the purpose of each facility and provides an overview of its use.

USER-DEFINED VARIABLES

One of the powerful features of the SPSM is the ability to evaluate user specified expressions. These expressions allow users to create their own variables as logical

and arithmetic manipulation of other SPSD/M variables. The expressions can be used in many of the SPSM user facilities described below. Expressions can allow users to simulate entirely new tax and transfer programs totally within the black box mode. The following elements may be combined to form valid user expressions.

Variables	Any database, modeled, or user defined variables
Operators	Logical (and &&, or ||, not !), comparative (<,<=,==,!=,>=,>), and arithmetic (+ - * /)
Constants	Any number
Parentheses	To control the order of evaluation of expressions
Level of analysis override	The level of analysis of a variable

For example, the following expression could be used to produce a variable which represents the ratio of average employment income to total income for individuals aged 21 to 64.

```
((idage >= 21) && (idage <= 64)) * idiemp/imitot
```

The term to the right of the multiplication sign (*) says that for any given individual take the total income and divide it by the employment income of that person. This produces the proportion of total income accounted for by employment income. Now consider the term to the left of the *. If an individual is over 20 years old and less than 65 years old then the first term will evaluate to 1 and the value of the expression becomes the value of the second term (the employment income ratio). If, however, the individual is under age 21 or over age 64 then the first term, and consequently the entire expression, will evaluate to 0.

Note that in this example the end result, if tabulated using the X-tab facility, becomes an average of ratios. If we had wanted to examine the ratio of averages, we would simply include the relevant terms of the expression in a custom table request.

PARAMETER EDITING

Parameter editing is performed in the user dialogue during a program run or with a text editor prior to a program run.

User Dialogue Commands

The user dialogue session is the first step in an SPSM program run. It provides an interactive session for changing and examining parameter file contents. As already mentioned the dialogue proceeds in three stages that correspond to the three types of parameter files. Control parameters come first, followed by database adjustment parameters, and then by tax/transfer parameters. Following the last stage, control of the program run is passed from the user to the simulator.

If the user elects to modify parameters in one of the parameter files by answering `yes' to the appropriate question, the ==> prompt, indicating parameter editing mode, is displayed. Four commands can be used in response to this prompt in any of the three stages.

GO Terminate modification of this set of parameters, and continue with the next stage in the user dialogue.

LIST List all valid parameter names in the current parameter set on the user's display terminal.

READ Open and read a user-specified file containing values for one or more parameters.

‘name’ Engage in a dialogue to allow the display and modification of the parameter named `name'.

Changing Parameters

The SPSM uses several types of parameters. Different types are checked for validity using different rules. The following is a description of the parameter types currently defined:

FLAG A flag controls whether or not an algorithm (or program or calculation) is performed.

OPTION An option parameter allows the choice of one of two or more options.

SCALAR Scalar parameters take a single numeric value with or without a decimal point.

STRING A string parameter is a single line or multiple lines of text.

VECTOR A vector is a single column of numbers. The first value is the number of values which follow.

LOOKUP TABLE A lookup table contains a single value followed by a set of three columns. The first column represents the input value, such as taxable income. The second column represents the output value corresponding to the input value in the same column. The third column represents the marginal change in the output value for the next increment (or tax bracket).

TABLE A table is a numeric array with an arbitrary number of rows and columns. The array is preceded by a number indicating the number of rows which follow.

Parameter editing mode is entered by providing a parameter name in response to the ==> prompt. There are two distinct editing modes. In single-line mode, the parameter being modified is either a number or a short string. Multi-line mode, on the other hand, is used to view or modify a string parameter whose value may spill over into multiple lines. Multi-line mode can be recognized by a prompt of the form [1]. The number in square brackets gives the current line of the parameter being displayed or edited.

When single-line mode is first entered, pressing a key for any printable character will erase the currently displayed value, allowing the user to give a new value. Alternatively, a number of editing keys allow the modification of existing values. These keys are as follows:

ESC discards changes to the line, and restarts with the original value

INS toggle between insert and overtype mode.

HOME, END, BKSP, DEL, RT ARROW, LEFT ARROW have normal functions.

ENTER indicates that changes are complete.

In multi-line mode, a number of additional keys become active.

UP ARROW, DOWN ARROW go to previous or next line in the parameter.

CTRL-X Split line at cursor.

PgUp, PgDn first and last line of parameter.

Help Facility

At any time during the user dialogue the help facility can be accessed by pressing the F1 key. The help facility provides context-specific explanations of the various prompts encountered during the dialogue. This includes information on the types of parameters, the editing keys and editing procedures, and the available commands.

A future release of SPSD/M will include help information on all parameters and variables.

Batch Mode

The dialogue manager is the only means by which input parameters are specified to the SPSM. However, there are three ways to provide information required by the dialogue manager, one interactive and two in batch mode. The first batch mode option is to include a command string as an argument when invoking the SPSM. The command string will take the form of a series of responses to the prompts in the order in which they are required. These are actually the exact keystroke sequences which would be used in an interactive session. The following example will run the default simulation on the `ba92t.cpr` control parameter file, the same program run as was performed in an earlier example. Note that the following is the exact sequence of keystrokes that the user typed during that user dialogue session except that carriage returns have been replaced by "#" characters.

```
SPSM \spsd\ba92t#test1#n#n#n#n
```

The second batch mode option is to create a file which contains the responses for a complete dialogue session using a full screen editor. Using the example above, such a file would look like this:

```
\spsd\ba92t
test1
n
n
n
n
```

If we had created a file with the above contents called `TEST.CMD` we could then run

the SPSM using this file by typing `"SPSM TEST.CMD"`.

The use of batch mode, and especially `.CMD` files can, assist greatly in organizing and documenting your work. Batch mode lets you avoid repetitive dialogue sessions. It also allows you to prepare a number of SPSM program runs which may then run unattended overnight on your PC.

SCREENING RECORDS

A user will not always wish to simulate scenarios for every individual on the database, either because of the time required or because the simulation is applicable to only some sub-group of the population. In these instances the user will want to make use of the sub-sample facility or the selection facility. By using random number stream variables the user may employ these facilities to create take-up rates in black box mode.

Sub-Sampling

The SPSM can take a considerable amount of time to compute results for the entire SPSD database, particularly if computational intensive facilities have been activated. In order to quickly assess the validity of a run, or to explore the broad effects of parameter changes, SPSM incorporates a sub-sampling facility.

Sub-sampling can be controlled in two ways. In the first method, the user sets a control parameter to the sub-sample desired. SPSM will then read and process the SPSD until the desired sub-sample has been attained. In the second method, the user presses the CTRL-BRK key combination to interrupt the run after some fraction of SPSD has been processed. In either case, the sub-sample actually obtained is recorded in the control parameter file, and output tables are scaled by the reciprocal of this value.

Reading of the SPSD always proceeds sequentially, but a relatively unbiased sub-sample is nevertheless obtained because households in SPSD are by and large randomly ordered. The ordering is not completely random, however. In order to improve the accuracy of results obtained when using sub-sampling, SPSD has been arranged as a running stratified sample. Samples of set sizes (the first 5%, 25%, and 50% of the file) have been arranged to have representative provincial and household income distributions. The demonstration version of SPSD is identical to the 5% stratified sample.

Selection Facility

The SPSM selection facility provides a means to restrict the set of individuals and families which are processed by the SPSM output and reporting facilities. Selection satisfies two distinct needs. Firstly, it allows the analyst to focus attention on a particular sub-group of interest. Secondly, it can allow SPSM to execute faster by restricting the number of households processed to those of interest.

A string parameter contains an expression which is evaluated for each individual in the household. If the result of the evaluation is non-zero, the individual is considered to be selected. If an individual is selected, then **everyone** in the same family unit is also selected, irrespective of the evaluated value of the selection expression for other individuals. In other words, if at least one person in the family unit is selected, the entire family unit is selected.

To compute taxes and transfers correctly, SPSM always simulates entire households. Because of this, selection has no effect on the values of any variables, modeled or database, at the individual level. If, however, an examination of the database variables in the selection expression indicates that no individual in the household could possibly be selected, then SPSM skips immediately to the next household. This can result in a considerable decrease in SPSM execution time.

USER-DEFINED VARIABLE FACILITY

As already discussed, the SPSM has two distinct modes of use, termed 'black box' and 'glass box'. The 'glass box' mode provides the user with considerable flexibility to design new algorithms and create new variables, but it can be somewhat complicated to use, and requires some knowledge of programming. The user-defined variable facility (UVAR) allows the user to create new reporting variables in 'black box' mode. It allows the user to perform many analyses that would otherwise require programming changes to SPSM.

A new variable can be used just like any other SPSD/M variable. SPSD/M variables have built-in labels which are used by the SPSM reporting and output facilities. The user can supply a label to an analysis variable or it will use defaults. SPSD/M user variables also have an associated output precision, which gives the number of digits after the decimal point to use when formatting the variable in reports.

There are many applications for these variables. Counts of individuals or family units with specified characteristics, take-up rates, averages, percentages and even new benefit functions can easily be incorporated in black box mode.

CREATING TABLES

Automatic Parameter Reporting

Comparisons between parameter files are essential in order to isolate exactly what has changed between any two simulation scenarios. The SPSD/M provides two tools for this. The first is a tax/transfer parameter comparator whose output is stored in the `.TBL` file and is activated with using a control parameter. This report shows tax/transfer parameter differences between base and variant scenarios.

A more sophisticated parameter difference report can be obtained by using the `compparm` utility, which is documented in the *Tools User's Guide*. This is an auxiliary executable program which can compare any of the three types of parameter files. The program writes the differences to the screen in a nicely formatted table, but output can be re-directed to a file or to a printer if desired.

Built-in Tables

The SPSM is capable of producing ten different built-in tables. The tables have been designed to contain a large amount of data which can be processed to produce additional statistics. So, for example, the tables do not provide information on average OAS benefits. However, they do provide information on the total value of OAS benefits as well as the number of recipients of OAS which can then be used to determine average benefits.

The tables are grouped into five sets of pairs. The first table in each pair contains values in millions of dollars for over fifty selected variables. The second table in each pair contains the number of persons, families or households (controlled by the user) which had some non-zero value for the variable reported. A listing of the variables reported in these tables is shown in section 2.4 where the results of Table 0 can be seen. The five groups produce the following types of tables.

Table 0 and 0A	Canada totals
Table 1 and 1A	Totals by province
Table 2 and 2A	Totals by income group
Table 3 and 3A	Totals by family type
Table 4 and 4A	Totals by proportion of a specified income threshold

The user has only limited control over the format and contents of these tables. The user specifies a level of analysis which applies to all of the built-in tables. He or she can also specify the variable as well as the cut-points to be used in determining the columns of Table 2. Thus the user can easily create a table of results by age. A separate utility allows any of these built-in tables to be transformed into a format which is readable by Excel spreadsheets. An Excel spreadsheet which produces auxiliary statistics from these tables is also included. Purchaser's of the Full SPSD/M package may refer to the *Tools User's Guide* for further details.

User-specified X-tab Facility

The designers of the SPSM recognize that the built-in tables will not always meet the analyst's needs. Thus, a powerful facility that allows a user to create specific customized tables has been provided. A separate auxiliary guide, *XTab User's Guide*, presents detailed documentation on the X-tab facility in a comprehensive format that is also suited to those learning to use the facility.

An individual tabulation request consists of multiple components. It typically begins with the specification of the relevant unit of analysis, i.e. individual (IN:), nuclear family (NF:), census family (CF:), economic family (EF:) or household (HH:). If the tabulation request does not include a unit specification, a default unit of individual (IN:) applies. The remainder of the tabulation request consists of one or more "levels" separated by asterisks. One of the levels, the tabulation level, indicates the item or items to be tabulated. Any remaining levels are classification levels. They specify the particular pattern of categorization desired in the table.

Naturally, there are some restrictions on just what the X-tab facility can tabulate, but the design of the SPSM makes it quite flexible. For starters, the analyst can tabulate any analysis variable (any non-categorical variable) available in the SPSD or calculated in the SPSM. Complete lists of these variables appear in the ***Variable Guide***. As well, the analyst can tabulate any of the user-defined "*ex*" variables. Further, the analyst can define "on the fly" the desired tabulation expressions, constructing them from any of the preceding types of variables and appropriate mathematical operators.

An example of a table request is:

```
EF:hdprov+ * {units}; CF:{immtot, units, immtot/units} * hdtenur+
```

This request would generate two tables. The first would contain values for the number of economic families in each province as well as a total row. The second table (to the right of the semi-colon) would tabulate total income accruing to census families, the numbers of such families, and the average income per census family, all broken out by tenure categories (rented, owned with mortgage, etc.) as the columns.

DISTRIBUTIONAL ANALYSIS FACILITY

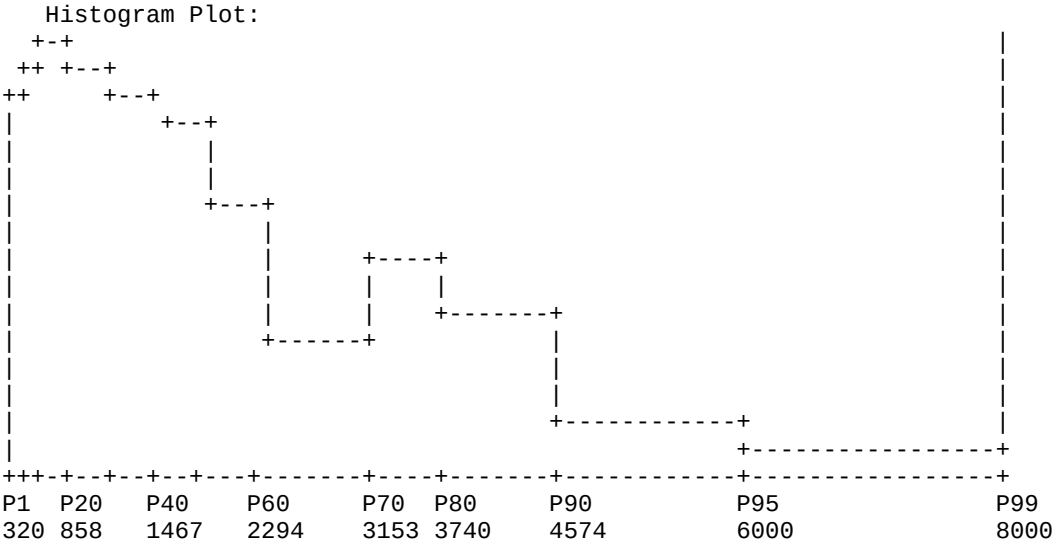
The distributional analysis facility calculates a set of univariate distributional statistics for a sample of SPSD cases. If the distributional facility is activated a user specified random sample of up to 10,000 cases is stored and sorted in memory and distributional statistics are calculated on this sample. The statistics provide the following information.

- Number of zero and non-zero observations
- Descriptive Statistics (sum of weights, sums, sum of squares, weighted mean)
- Extreme values (bottom five values and top five values)
- Selected quantiles (quintiles, quartiles, etc.)
- Histogram plot

All output from the distributional facility is written to the `.TBL` file for the program run. An example using the distributional facility is shown in tutorial Session 4. The following is an example of output from the distributional facility that has been produced for the variable *imccea* (Child Care Expenses Allowed).

```
                                SPSD/M (Version 6.00)
                          Base Description: No base results
                         Variant Description: Current values for 1992
                    Sample: 1.0000 AGENAME='Standard adjustment'
           Distribution report: Child care expenses allowed for Individuals
              Total observations =  200264
              Zero observations  =  194998
              The following statistics are based on 5266 non-zero observations.
              Descriptive Statistics:
           Done for all records
Done for      Sum of weights          =       699640
all           Weighted Sum            =   1700095111
records       Weighted Sum of Squares = 642937195486
              Weighted Mean           =         2430
              Extreme Values (with associated household numbers):
                 Minima  hdseqhh                 Maxima  hdseqhh
                      8    17244                  12000     7376
                      8    17245                  12000    17870
                      8    59930                  12000    20694
                     33    22107                  12000    27402
                     44    59185                  12000    27403
Done for    The following statistics are based on a sample of 3000.
sample      Selected Quantiles:
              Q1 = 986   P1= 320   P90=4574   P20= 858   P60=2294
              Med=1833   P2= 367   P95=6000   P30=1144   P70=3153
              Q3 =3520   P5= 440   P98=8000   P40=1467   P80=3740
                        P10= 587   P99=8000
```

Note that the maximum value on the database is equal to a full deduction for three children. If extreme values are not as anticipated, the user can then produce a detailed report on the relevant households by using the selection facility and the print file output facility.



The distribution report has been produced for all non-zero values of imccea showing the skewed, truncated shape of the density function for the tax expenditure. The bi-modal distribution reflects the maximum claim for families with different numbers of children.

MARGINAL TAX RATE FACILITY

The marginal tax rate is defined as the proportion of an extra dollar of income that is taxed. It is a useful concept because it measures the extent to which incentives to obtain additional income are reduced by the tax/transfer system. SPSM provides a facility to compute marginal tax rates. When the facility is activated, the tax/transfer system is applied twice to each household: once to the original incomes and once to the incremented incomes, and the resulting change in consumable income is noted.

The definition of marginal tax rate given above is not complete. To calculate a marginal tax rate, one must in addition specify the source of income being incremented, the amount of the increment to income, and which individuals are to receive the increment. The change in consumable income at the individual level can then be aggregated to produce marginal tax rates at different family levels of analysis.

Marginal tax rates differ depending on the family level of analysis. Consider a married couple, where one person has zero income. If $500 is given to the individual with no income, that person's marginal tax rate would be zero. The consumable income of the person's spouse would decrease however, due to a reduction in the married tax credit/deduction. Hence the marginal tax rate of the spouse would compute to an infinite value, since the spouse's taxes have increased, even though he/she received no additional income. Considered as a family, however, the marginal tax rate would evaluate to a reasonable value.

CASE OUTPUT FILES

In addition to tabular data the SPSM can write out information from the database and model to a data file in a number of different formats. These files contain the specified sub-sample of an individual SPSM program run and can be used for subsequent analysis using either the SPSM, a text editor, or another software product. The cases written can be at any level of analysis and may include any database or modeled variables. For example a SAS file could be created containing the age, sex, census family type and incomes of all individuals aged 18 to 64. Alternately a file containing the urbanization class, province, residential tenure, number of children and government cash transfers of all census families in Alberta could be produced.

With the exception of SPSM results files, all files can contain user-defined variables. Users should be aware that the files created with this facility are not as compressed as are the main SPSD and SPSM result files. For this reason they can easily exceed five megabytes and should be created with regard to the available space on your hard disk. For example, even a SAS file for all individuals with only three variables per individual can occupy 750K on disk.

Text Output Facility `(.csv)`

The SPSM text output facility creates a character file containing case by case micro-data information. One can either print or observe it directly, or one can use it as input into some other computer program, such as a spreadsheet, database system,

or other SPSM facility.

The variables whose values are to be displayed are given in a string parameter (ASCVARS). Each case that is output corresponds to the level of analysis given in another control parameter (ASCUNIT). The selection facility is generally used in conjunction with this facility, since otherwise very large files could result. The facility is especially useful for testing new scenarios. For example, if a number of households losing disposable income are noticed in a run that should only result in gainers, the relevant information on an entire losing household can be printed out and examined.

A number of styles of output are supported. An ASCSTYLE value of 1 produces a report designed to be easily human-readable. One household is output per page, and one variable is output per line as shown below.

Text output facility style #1

```
<page break>
hdseqhh  Household sequence number ............    61
idefseq  Economic family sub-sequence number ..     0     0     0
idcfseq  Census family sub-sequence number ....     0     0     0
hdprov   Province .............................     6
idage    Age ..................................    28    24     0
idsex    Sex ..................................     0     1     1
idcfrh   Relationship to census family head ...     0     1     2
immmkt   Market income ....................... 27953 17350     0
immtran  All transfer income ..................   194   371     0
<page break>
hdseqhh  Household sequence number ............    62
idefseq  Economic family sub-sequence number ..     0     0     0
idcfseq  Census family sub-sequence number ....     0     0     0
hdprov   Province .............................     6
idage    Age ..................................    53    50    18
idsex    Sex ..................................     0     1     0
idcfrh   Relationship to census family head ...     0     1     2
immmkt   Market income ....................... 36457  3750  4274
immtran  All transfer income ..................     0  1222     0
```

An ASCSTYLE value of 2 produces a report designed to be read using a spreadsheet import function while 3 produces a report designed to be read using a spreadsheet or a database system. An ASCSTYLE value of 5 produces a report designed to be converted into a compressed format that can be read by the SPSM. This feature allows users to modify SPSD database files.

Below is an example of ASCSTYLE=5 for one household (not all variables values are shown).

```
000001 47 217 2 1 2 1 3 4 1
0 0 0 0 0 0 0 0 42 0 3 11 13 99 1 2 3 0 52 1 0 0 0 0 0 0 0 0 0 1 0
0 0 ...
```

SAS Output Facility (.SSD)

SAS Institute produces a microcomputer version of their mainframe Statistical Analysis System with almost identical functionality. SAS has extensive facilities for

analysis, reporting and manipulation of files of microdata. In order to take easy advantage of these facilities, SPSM incorporates an interface to the SAS PC system. This interface produces self-documenting binary files in the same format that SAS itself uses to store data. As a result, data can be made accessible to SAS without the awkwardness of dealing with character file layouts, appropriate variable definitions and labels, etc. Another benefit is that disk requirements and execution time are greatly reduced, since SAS would normally have first to read in a large character file and then convert it into a large binary file before any operations could be performed on the data.

Many operations that can be performed with SAS, such as record selection, creation of new variables, cross tabulation, and distributional analysis can be performed using built-in SPSM facilities. These facilities operate many times faster than their SAS equivalents and don't require large amounts of disk space. Therefore as a general rule, the built-in SPSM facilities should be used in preference to a SAS solution wherever possible. Only if the user needs to perform a function that SPSM cannot handle should SAS be used. Examples of applications that require SAS include: regression analysis, scatter plots, and microdata analysis.

SPSM results file (`.MRS`)

The SPSM can produce a special file known as an SPSM results file. This file is written using the same data compression techniques as the SPSD files. Because of this, SPSM results files occupy a modest amount of disk space but they can only be read by the SPSM program. The results file is written using the variant results, typically so that it can be read in as base results in a subsequent run. If base results are generated by reading in an existing results file, the SPSM operates about twice as fast as if results had been calculated "on-the-fly".

The SPSM results file is always written at the individual level of analysis and may contain any number of modeled variables, with one exception: no variables created in the user variable facility may be written to an SPSM results file.

TURNING POINT FACILITY

The SPSM Turning Point Facility provides a means to analyze the points at which an individual household's marginal tax rate changes as its income increases. The marginal tax rate is the proportion of tax that is paid on one additional dollar of income. The turning points represent changes in the slope of the entire tax/transfer function (the marginal tax rate). The facility computes the various income levels where an individual household, given its characteristics, would experience changes in its marginal tax rate and then outputs information on the current value of a number of variables at each of these levels of income. The facility is useful for determining, for example, if a proposed means tested social assistance program will result in a disincentive to look for employment.

GOAL-SEEKING FACILITY

This tool is useful for answering "what if" type questions. For example, what would

be the federal surtax rate necessary to achieve revenue neutrality, given the federal manufacturer's sales tax is eliminated in 1997? It would be possible to answer this question by first running a 1992 base case to observe the level of federal tax revenue obtained when manufacturer's sales taxes are collected and then creating a variant case which sets manufacturer's sales taxes to zero.

The facility operates by iteratively executing a black box version of the SPSM and manipulating the parameter files between runs based on the values found in the default tables.

REFERENCE VARIABLE FACILITY

Values of any number of modeled variables produced in an SPSM run can be accessed in a subsequent run by using SPSM reference variable facility. The facility permits the simultaneous comparison of any number of simulation scenarios. The most common use of the Reference Value Facility is to access user variables produced in a previous run. The reference value facility can also be used to replace the values of SPSD variables. The user may use this feature to, for example, model a behavioural response of persons responding to a shortfall of UI benefits by increasing their employment income.

Example Simulations

This section contains several worked examples of SPSD/M use. They should be performed by the user at his or her microcomputer in the sequence presented here. The examples provide guidance on using some of the many SPSD/M features.

The complete dialogue for producing each example run is given below. Inputs that the user typed have been shown in **bold**. Lines have been numbered in square brackets, and notes on these inputs have been interleaved with the dialogue. The notes make general comments concerning the SPSM as well as pointing out specific features highlighted in the tutorial example. The symbol CTRL-X is used to indicate that the user has typed the X key while holding down the CTRL key. ENTER indicates that the user has pressed the enter key.

Before you begin you must have correctly installed the tutorial version of the SPSM with the INSTALL program, following the instructions in the *Installation Guide*. Ensure that MS-DOS environment variables and configuration information have been set correctly.

The text and results obtained with your computer may not exactly match the results printed in this guide. The results on your screen, if the example steps are followed exactly, should be interpreted as correct. This is due to the fact that the documentation sometimes lags the most recent version of the software. Please call Statistics Canada at (613) 951-3774 should you have any questions.

SESSION 1: CREATE VARIANT RESULTS FILE

This example makes a simple single program run with the SPSM. We will establish

a new working directory and create an SPSM results file, a control parameter file and an algorithm control file and a table file. This example highlights the dialogue manager and the steps required for a normal program run.

The first step in our example includes creating a new working directory and invoking SPSM.

```
[1]    C:\> MKDIR \SPSMTEST
[2]    C:\> CD \SPSMTEST
[3]    C:\SPSMTEST> SPSM
```

1. Any analysis with the SPSM will usually begin by setting up a working directory for the parameter files and output files pertaining to the particular analysis, in this case named `\SPSMTEST`.

2. The working directory should then be made the current directory.

3. The executable program is invoked by typing SPSM. Remember that the MS-DOS search path must contain `\spsm\win32`. At this point the SPSM program is loaded into memory and execution begins. The user will first see a copyright message, particular to their version of the SPSD/M, briefly displayed on the screen. Shortly thereafter the message disappears and the SPSD/M start-up screen appears.

```
                        Welcome to the Statistics Canada

                    Social Policy Simulation Database / Model
                                  ( SPSD / M )
                      Program Version                 : 8.00
                    Database Adjustment Algorithm   : Standard
                Standard Tax/Transfer Algorithm : Version 8.0: 84-03
                    Alternate Tax/Transfer Algorithm: none/aucun
                 Compiler / Operating System     : MSC 12.0 / WIN/NT

                          Copyright (c) Minister of Industry
                                     1984 – 2000

                        Welcome to the Statistics Canada

                    Social Policy Simulation Database / Model
                                  ( SPSD / M )

[4]             Program Version                 : 8.0
[5]             Database Adjustment Algorithm   : Standard
[6]             Standard Tax/Transfer Algorithm : Version 8.0 : 84-03
[7]             Alternate Tax/Transfer Algorithm: none/aucun
                Compiler / Operating System     : MSC 12.0 / WIN/NT

                Copyright (c) Minister of Industry
                                  1984 – 2000


      Press 'F1' for context-specific help.
      Press Ctrl-Break to terminate.
      ==================== Control Parameters ======================
[8]   Enter name of input control parameter file ==> \spsd\ba92t
      Loading control parameters from '\spsd\ba92t.cpr'
[9]   Enter specification for generating output files ==> test1
      Generating default output file names.
```

4. The SPSM start-up screen provides information on the executable program. The program version reflects the Statistics Canada release number.

[5,6] These three algorithm labels describe the set of C++ Language programs used to create the executable program. These programs can be modified and recompiled in "glass box" mode.

7. No "glass box" alternative algorithm exists in this version.

8. The name of a valid control parameter file (`.cpr`) must be specified, with a path name if the file is not in the current directory. The `ba92t.cpr` file contains default settings for the status quo 1992 tax/transfer system with sales taxes. Note that the `.cpr` extension can be omitted from the file name.

9. A valid MS-DOS filename should be specified. The default filenames are set to this filename with an extension appropriate to the type of output file.

Given the previous dialogue the SPSM then finds the specified control parameter file and displays some of its key contents as follows:

```
      Current values of selected control parameters:
[10]   CPRDESC      Tax/transfer:1992 Population:1992 Incomes:1992 (1992$) [5%]
       LICENSEE     Statistics Canada    # SPSD/M licensee
      Selection/Sample
       SELFLAG             0             # Selection facility activation flag
       SAMPLEREQ     1.000000000         # Size of sample requested
       INPSPD       $SPSD/v80y96t.spd    # Name of SPSD file (in)
       INPFXV       $SPSD/v80y96t.fxv    # Name of FAMEX vector file (in)
       INPWGT       $SPSD/v80y92t.wgt    # Name of weight file (in)
      Growth
       INPAPR       $SPSD/ba96_92.apr    # Name of database adjustment parameter
                                           File
      Scenario Control <no base, variant computed using parms>
[11]   BASMETH             0             # Method of creating base variables
[12]   VARMETH             2             # Method of creating variant variables
       INPVARMPR    $SPSD/ba92.mpr       # Name of variant tax/transfer parameter
      File
      Output Files
[13]   OUTMRSFLAG          0             # Variant results file creation flag
       OUTCPR          test1.cpr         # Name of control parameter file (out)
```

10. Control parameters showing all input and output file specifications are displayed. The description of the control file reflects the status quo 1992 tax/transfer system (with sales taxes). The 5% database files are used as input which will provide a 5% sample. Default Table 0 will be output.

11. The BASMETH parameter (method of calculating base results) is set to zero by default so that base results will not be calculated.

12. VARMETH (method of calculating variant results) is set to two by default so that the standard algorithm will be used to calculate variant results. Note that the INPVARMPR parameter is set so that the variant tax/transfer algorithm control parameters will be read from the default file \SPSD\BA92.MPR.

13. Note that the flag for controlling the writing of a results file is turned off. We will have to edit the value of this parameter during the dialogue in order to activate the facility and cause a results file to be produced.

```
[14]  Do you wish to modify any control parameters ? ==> y
[15]  ==> cprdesc
             Description of SPSM run [string]
[16]  CPRDESC ==> Tax/transfer: 1992 Population:1992 Incomes:1992 (1992$) [5%]
      ==> outmrsflag
             Variant results file creation flag
[17]  OUTMRSFLAG ==> 1
      ==> outmrsvars
             Variant results file variables [string]
[18]  OUTMRSVARS ==>
      [00] immicons immdisp imffa impfa
[19]  ==> go
      No files will be overwritten with these control parameters.
[20]  Any further control parameter changes ? ==> n
      Writing out control parameters to 'test1.cpr'.
```

14. The parameters which control the reading of input files and production and contents of output results files are control parameters.

15. The control parameter file description should be changed to add the fact that

a results file is being produced.

16. The new description has the same information as the old but it notes that a results file will be created.

17. This parameter should be set to one to cause a results file to be produced.

18. This parameter is set to a character string whose contents are the names of valid SPSM variant variables which will be written into the results file. This setting specifies four variables to be written to the results file; disposable income, consumable income, federal family allowances and provincial family allowances. This setting will replace the default of *immicons*.

19. To proceed to the next phase of the SPSM dialogue the command "go" is entered.

20. The user is prompted to be sure that no further control parameter changes are needed. The usual response is no or n. The program then writes out a copy of the modified `.cpr` parameter file and proceeds to the next phase of the dialogue.

```
      ================== Database Adjustment Parameters =================
[21]  Loading database adjustment parameters from '$SPSD/ba96_92.apr'
      Current values of selected database adjustment parameters:
       GFISENF        10       # Growth Factor: Self-employed income -non
         0.87580
         0.96300
         0.92010
         0.84940
         0.91630
         0.87010
         0.87730
         0.82230
         0.91340
         0.91060
      GFIEMP        10                  # Growth Factor: Employment income
         0.94650  0.94650
         0.93010  0.93010
         1.04530  1.04530
         0.96480  0.96480
         0.98370  0.98370
         0.98810  0.98810
         1.01400  1.01400
         0.94660  0.94660
         0.98180  0.98180
         0.97890  0.97890

[22]  Do you wish to modify any database adjustment parameters ? ==> n
      ==================== Tax/Transfer Parameters ==================
      Loading variant tax/transfer parameters from '$SPSD/ba92.mpr'
      Current values of selected variant tax/transfer parameters:
       MPRDESC      Current values for 92
[23]   CTFLAG              1             # Commodity tax activation flag
       CTOPT               2             # Commodity tax calculation method
       CTDFLAG             0             # Commodity tax detailed calculation flag
       TARGETYEAR       1992             # Year of analysis
       PEROPT              2             # Personal exemption/credit option
       QREFOPT             2             # Quebec deduction/credit option
[24]  Do you wish to modify any variant tax/transfer parameters ? ==> y
      ==> mprdesc
             Description of tax/transfer parameter file
[25]  MPRDESC ==> My 1992 Base Run, 1992 SPSD/M Defaults in Place
[26]  ==> go
      Writing out changed tax/transfer parameters to 'test1.mpr'.
      Changing INPVARMPR from '$SPSD/ba92.mpr' to 'test1.mpr'
```

21. Default adjustment parameters are loaded from the `\spsd` directory as specified by the default in the control parameter file.

22. No changes to the standard database adjustments are required for 1992.

23. The `CTFLAG` parameter indicates that commodity (sales) taxes will be calculated.

24. Any desired changes to parameters that effect the execution of the variant tax/transfer algorithm should be given in this phase of the dialogue.

25. It is good practice to keep current descriptions in the parameter files. `MPRDESC` is set to an appropriate label for this run.

26. The `go` command tells the SPSM to proceed with the execution of the simulator. Note that if any of the tax/transfer parameters are changed a new .mpr file will be written. In this case the `INVARMPR` parameter in the `test1.cpr` control parameter file will be changed to the name of the output `.mpr` file. This ensures that a subsequent SPSM execution using `test1.cpr` will refer to the new set of tax/transfer parameters.

```
      ========================= Execution ======================
[27]   SPSM          started   on Tue Jun 13 09:59:20 2000
       SPSM          completed on Tue Jun 13 09:59:22 2000
       Elapsed time= 00:00:02
       Number of households processed=  3551
       Number of persons     selected= 10353
[28]   Variant consumable income ($000,000):   346162.1
[29]   Control parameter file                 test1.cpr
       Table output file                      test1.tbl
       Variant tax/transfer parameter file    test1.mpr
       Variant results file                   test1.mrs
[30]  C:\SPSMTEST> dir
      Volume in drive C has no label.
      Volume Serial Number is F884-44FE

       Directory of C:\spsmtest

      06/13/00  09:59a        <DIR>          .
      06/13/00  09:59a        <DIR>          ..
      06/13/00  09:59a                12,430 test1.cpr
      06/13/00  09:59a               225,706 test1.mpr
      06/13/00  09:59a               105,122 test1.mrs
      06/13/00  09:59a                10,891 test1.tbl
                     6 File(s)        354,149 bytes
                              6,295,777,280 bytes free
```

27. The SPSM produces an estimated completion time which usually appears one minute after the start of simulator execution. This is not present here because of the speed of the computer which ran the demonstration.

28. The SPSM also reports on the simulated income in millions of dollars. If a base and variant are run the model also reports on the difference in consumable income between the two scenarios.

29. The SPSM always indicates the files that have been output. These files have all been written to the current directory as can be seen by checking the `\SPSMTEST` directory's contents.

30. In this example the MS-DOS `dir` command is invoked after the SPSM has finished, to display the contents of the `\SPSMTEST` directory. The table file will be identical to that created in the quick start example in Section 2.

SESSION 2: CUSTOM TABLES, SCREENING RECORDS, USER ANALYSIS VARIABLES.

In this example, the results file created in Session 1 is compared with a variant in which all family allowances are eliminated. The time required to run the SPSM is roughly cut in half by reading a base results file rather than calculating base results.

As a further time saving measure the simulation run will only be conducted for census families having children because those are the only recipients whose economic position will change as a result of the elimination of family allowances. The run will produce two custom tables which make use of several features.

The example makes use of an auxiliary parameter include file (`session2.cpi`) which was created using a text editor and is supplied in the directory `\SPSM\EXAMPLE`. This file will be read in during the interactive dialogue. This technique is one way of organizing your work and minimizing repetitive dialogue sessions. This example will first examine that input file, the model dialogue, and finally the results tables.

The following three figures provide a listing of the file `session2.cpi`. It was created by editing the base 1992 control parameter file. Only those groups of parameters which will differ from the base are retained along with their labels. The "#" mark indicates comments.

```
      ####
[1]   ##session2.cpi – Include file for tutorial Session 2
      ##
      ##$Id$
      ##
      ##Purpose: This file contains the necessary control parameters to run
      ##         tutorial session 2.  The explanation of the parameters may
      ##         be found in the Introduction and Overview Guide. The User
      ##         is still required to edit the tax/transfer parameters in
      ##         the user dialogue.
      ##
      ############################################################ ##########

      ##    2.1 Model Control Parameters
[2]   CPRDESC    Base/Variant elimination of Family Allowances, X-tab Table

      ##    2.1.7 Record selection facility
      SELFLAG             1             # Selection facility activation flag
[3]   SELUNIT             2             # Selection facility family level
[4]   SELSPEC      nfnkids > 0          # Selection specification

      ##    2.1.5 Base Information
      BASDESC      My 1992 Base Results File, 1992 SPSD/M Defaults in Place
[5]   BASMETH             1             # Method of creating base variables
[6]   INPBASMRS       test1.mrs         # Name of base results file (in)
```

1. Descriptive headers which document the file may be found on all include (`.cpi/.mpi`) files supplied with the SPSD/M.

2. Correct file documentation should be maintained. The SPSM will interpret any value supplied here as a character string up to a maximum of 60 characters. The SPSM will truncate any specified strings which are longer than 60 characters.

3. The selection unit specifies that selection will occur at the census family level of analysis.

4. This expression will be evaluated for every individual on the database and then propagated to the nuclear family level of analysis.

5. Base results will be produced by reading an existing SPSM results file.

6. The name of the results file created in the previous example, Session 1, is specified. Recall that this contains values for the 1992 tax/transfer system for four simulated variables; disposable income, consumable income, federal family allowances, and provincial family allowances.

```
      ##     2.1.4 Variant Information
[7]   VARDESC      1992 Tax System, No Family Allowances

      UVARFLAG            1
[8]   UVAR
[9]   deltacon=immicons - _immicons;
      label (deltacon)="Change in Consumable Income";
      deltadsp=immdisp - _immdisp;
      label (deltadsp)="Change in Disposable Income";
[10]  totalfa=_imffa + _impfa;
      label (totalfa)="Total Family Allowances";
[11]  iskid=idage<18;
      label (iskid)="Child";
[12]  dispgrp=split(NF:_immdisp,5000,10000,15000,20000,25000,300
      00,35000,40000,45000);
      label (dispgrp)="Base disposable income group";
```

7. The variant run which will be compared to the status-quo 1992 system is labeled.

8. We will use the user variable facility to examine model results of interest.

9. We will want to report on the difference in disposable and in consumable income between the base and the variant. The difference in consumable income will be stored in the user defined variable *deltacon*. The expression should be read as deltacon equals variant consumable income minus base consumable income. Note that the leading underscore refers to the base variable value while no underscore refers to the variant variable value. *deltadsp* is the corresponding variable for disposable income.

10. We will report on both the federal family allowance program as well as all provincial (Quebec) family allowance programs. Since no combined variable exists it is created here.

11. We wish to generate statistics on the average number of children in a census family. However the variable *cfnkids* (number of children in the census family) is a classification variable and cannot have mathematical actions performed on it. Therefore we create a new analysis variable (*iskid)* which is simply a flag which is set to one if the individual is less than age 18 and is zero if the individual is age 18 or over. This variable may then be added up etc. in the X-tab facility.

12. We will want to report on losses of family allowances by level of nuclear family disposable income. Because disposable income is an analysis variable we must specify the desired breakpoints in this continuous variable. The breakpoints are arbitrary and use $5,000 intervals.

```
      ##     2.1.13 Reports
      ##     2.1.15.1 Built-in tables
[13]  T0FLAG         0                  # Table 0 request flag
      ##     2.1.15.2 User-specified Tabulation facility
[14]  XTFLAG              1             # X-tab facility activation flag
      XTSPEC
[15]  NF: nftype+ *
               { totalfa/units: L="Base Average FA",
                 deltacon/units: L="Mean Change: Consumable Income",
                 deltadsp/units: L="Mean Change: Disposable Income",
                  (totalfa+deltadsp)/units: L="Effective Income Tax on FA",
                 (deltacon-deltadsp)/units: L="Effective Sales Tax on FA"};
[16]  NF: dispgrp+ *
                 { deltadsp/units: L="Mean Change: Disposable Income",
                   iskid/units: P=2 L="Avg. children per family",
                   units: L="Census Families",
                   scfrecs: L="SCF Records"};
```

13. Note that the hard-wired table, whose production is requested in the default control parameter file, (`ba92t.cpr`) is being turned off here. No built-in tables will be produced.

14. The flag to enable the production of user-specified tables is turned on. The table specification discussed next is fairly complex and readers already feeling a little overwhelmed may wish to proceed to the execution phase of the example on the next page.

15. This is the specification for the first of two custom tables. It is given as one long string parameter (`XTSPEC`) which is continued onto subsequent lines. The first table will be based on the nuclear family unit of analysis (`NF`:), and will produce statistics broken into different rows by census family type with a total row at the bottom (*nftype*+). The various columns, which will be produced, are shown on separate lines in `session2.cpi` to enhance readability. For example, the first column will display the average federal family allowances for census families with children.

16. The second table will produce results by level of disposable income.

The file `session2.cpi` described above can be found in the `\SPSM\EXAMPLE` directory. We will use this file to change all the control parameters in the user dialogue. With a little practice the creation and use of these files becomes quick and easy. Make sure that `\SPSMTEST` is the current directory and start the SPSM program run.

```
C:\SPSMTEST> SPSM
                    Welcome to the Statistics Canada

                 Social Policy Simulation Database / Model
                              ( SPSD / M )
                    Program Version                 : 8.0
                 Database Adjustment Algorithm   : Standard
              Standard Tax/Transfer Algorithm : Version 8.0: 84-03
                  Alternate Tax/Transfer Algorithm: none/aucun
               Compiler / Operating System     : MSC 12.0 / WIN/NT

                       Copyright (c) Minister of Industry
                                1984 – 2000
                       Welcome to the Statistics Canada

                 Social Policy Simulation Database / Model
                              ( SPSD / M )

            Program Version                 : 8.0
            Database Adjustment Algorithm   : Standard
            Standard Tax/Transfer Algorithm : Version 8.0 : 84-03
            Alternate Tax/Transfer Algorithm: none/aucun
            Compiler / Operating System     : MSC 12.0 / WIN/NT

            Copyright (c) Minister of Industry
                                  1987 – 2000

     Press 'F1' for context-specific help.
     Press Ctrl-Break to terminate.
     ==================== Control Parameters ======================
[17] Enter name of input control parameter file ==> \spsd\ba92t
     Loading control parameters from '\spsd\ba92t.cpr'
     Enter specification for generating output files ==> test2
     Generating default output file names.
```

17. Even though we will be using the `.cpi` file to declare the parameters we want changed we must first specify a valid complete control parameter file. The name `test2` is specified to generate the names of output files.

```
Current values of selected control parameters:
 CPRDESC      Tax/transfer:1992 Population:1992 Incomes:1992 (1992$) [5%]
 LICENSEE     Statistics Canada    # SPSD/M licensee
Selection/Sample
 SELFLAG             0             # Selection facility activation flag
 SAMPLEREQ     1.000000000         # Size of sample requested
 Input Databases
 INPSPD       $SPSD/v80y96t.spd    # Name of SPSD file (in)
 INPFXV       $SPSD/v80y96t.fxv    # Name of FAMEX vector file (in)
 INPWGT       $SPSD/v80y92t.wgt    # Name of weight file (in)
Growth
 INPAPR       $SPSD/ba96_92.apr    # Name of database adjustment
                                     parameter file
Scenario Control <no base, variant computed using parms>
 BASMETH             0             # Method of creating base variables
 VARMETH             2             # Method of creating variant
                                     Variables
 INPVARMPR    $SPSD/ba92.mpr       # Name of variant tax/transfer
Output Files
 OUTMRSFLAG          0             # Variant results file creation flag
 OUTCPR          test2.cpr         # Name of control parameter file
                                     (out)
 Do you wish to modify any control parameters ? ==> y
```

From the selected list of parameters we can see that they are the same as the Session 1 example with the exception that `test2` is specified for naming output files.

```
[18]   ==> read
       Name of file to read ==> \spsm\example\session2.cpi
       parameter CPRDESC updated from file
       parameter VARDESC updated from file
       parameter BASMETH updated from file
       parameter BASDESC updated from file
       parameter INPBASMRS updated from file
       parameter SELFLAG updated from file
       parameter SELUNIT updated from file
       parameter SELSPEC updated from file
       parameter UVARFLAG updated from file
       parameter UVAR updated from file
       parameter T0FLAG updated from file
       parameter XTFLAG updated from file
       parameter XTSPEC updated from file
[19]   ==> go
[20]   No files will be overwritten with these control parameters.
       Any further control parameter changes ? ==> n
       Writing out control parameters to 'test2.cpr'.
```

18. Now the `session2.cpi` file can be read. The first step is to specify the read command. You will then be prompted for the name of the file to read. The dialogue manager then opens and reads the .cpi file and updates the values of the 13 parameters we specified earlier, and reports which parameters have been updated as shown on the next page.
19. All our control parameter changes were contained in the `session2.cpi` file so we can proceed to the next phase of the dialogue.
20. This message indicates that there are no existing files in the current directory which will be overwritten. If files already exist which would be overwritten by SPSM, the user is informed of this condition and is given the chance to change the output file names if desired.

```
       ================== Database Adjustment Parameters =================
[21]   Loading database adjustment parameters from '$SPSD/ba96_92.apr'
       Current values of selected database adjustment parameters:
        GFISENF        10       # Growth Factor: Self-employed income -non
          0.87580
          0.96300
          0.92010
          0.84940
          0.91630
          0.87010
          0.87730
          0.82230
          0.91340
          0.91060
       GFIEMP         10                  # Growth Factor: Employment income
          0.94650  0.94650
          0.93010  0.93010
          1.04530  1.04530
          0.96480  0.96480
          0.98370  0.98370
          0.98810  0.98810
          1.01400  1.01400
          0.94660  0.94660
          0.98180  0.98180
          0.97890  0.97890
```

```
[22]   Do you wish to modify any database adjustment parameters ? ==> n
       ==================== Tax/Transfer Parameters ==================
       Loading variant tax/transfer parameters from '$SPSD/ba92.mpr'
       Current values of selected variant tax/transfer parameters:
        MPRDESC      Current values for 92
        CTFLAG              1             # Commodity tax activation flag
        CTOPT               2             # Commodity tax calculation method
        CTDFLAG             0             # Commodity tax detailed calculation flag
        TARGETYEAR       1992             # Year of analysis
        PEROPT              2             # Personal exemption/credit option
        QREFOPT             2             # Quebec deduction/credit option
[23]   Do you wish to modify any variant tax/transfer parameters ? ==> y
       ==> mprdesc
              Description of tax/transfer parameter file
                                           # Source: Given as LABEL=...
                                           # Update: Value=LABEL
[24]   MPRDESC ==> 1992, No Family Allowances
       ==> faflag      Family allowance flag
                                            # Source: To calculate Federal and
       Provincial FA
[25]   FAFLAG ==> 0
       ==> go
       Writing out changed tax/transfer parameters to 'test2.mpr'.
       Changing INPVARMPR from '$SPSD/ba92.mpr' to 'test2.mpr'
```

21. The default parameter settings for the 1992 database adjustment parameters will cause database adjustment to be performed. The actual parameters are mostly set to `1`. Some expenditure adjustment parameters have however been set to scale up total expenditures for known underreporting problems.

22. Default database adjustment settings will be used.

23. The variant parameters must be modified in order to simulate the elimination of family allowances.

24. As noted before, up to date documentation should always be kept in the parameter files.

25. The FAFLAG parameter controls the execution of all federal and provincial family allowances and will be set to `0` to disable those calculations. This is the only change so the `go` command is entered to tell the SPSM to proceed with the simulation.

```
       ================================== Execution ========================

        SPSM          started   on Tue Jun 13 10:24:28 2000
        SPSM          completed on Tue Jun 13 10:24:29 2000
        Elapsed time= 00:00:01
        Number of households processed=  1591
        Number of persons     selected=  6080
        Variant consumable income ($000,000):   149869.0
        Increase from base        ($000,000):    -2408.0
        Control parameter file . . . . . . . . test2.cpr
        Table output file  . . . . . . . . . . test2.tbl
        Variant tax/transfer parameter file  . test2.mpr
```

26. The combined effect of screening records and reading a results file rather than calculating base results on execution time is significant. The same run

without the use of these features would take almost half again as long.

27. Note that the effect on consumable income of eliminating family allowances is a loss of $2.4 billion dollars. This is smaller than the 3.5 billion paid out in federal family allowances as estimated in the example simulation in the Quick Start section and represents the after-tax value to Canadians of the family allowances.

Let us now turn to examine the two user-specified tables that were produced by this run.

```
SPSD/M (Database 8.00)                    Tue Jun 13 10:24:29 2000
             Base Description: My 1992 Base Run, 1992 SPSD/M Defaults in Place
                 Variant Description: 1992, No Family Allowances
Sample: 0.0505  SELSPEC='nfnkids > 0'  AGENAME='Standard'

Table 1U: Selected Quantities for Nuclear Families by Nuclear family type

+-----------------------+---------+---------+---------+---------+---------+
|Nuclear family type    |  Base   |  Mean   |  Mean   |Effective|Effective|
|                       | Average | Change: | Change: | Income  |Sales Tax|
|                       |   FA    |Consumabl|Disposabl|Tax on FA|  on FA  |
|                       |         |e Income |e Income |         |         |
+-----------------------+---------+---------+---------+---------+---------+
|With Kids, 1 Adult     |      708|     -627|     -700|        8|       74|
|With Kids, 2+ Adult    |      899|     -536|     -602|      297|       66|
|With Elderly, 1 Adult  |        0|        0|        0|        0|        0|
|With Elderly, 2+ Adult |        0|        0|        0|        0|        0|
|Other, 1 Adult         |        0|        0|        0|        0|        0|
|Other, 2+ Adult        |        0|        0|        0|        0|        0|
+-----------------------+---------+---------+---------+---------+---------+
|All                    |      859|     -555|     -622|      237|       67|
+-----------------------+---------+---------+---------+---------+---------+
```

Table 1U is the name given to the first of the user specified tables. An examination of this table reveals the results of the specification provided earlier (see notes [13] and [14] in this example). Note first that all the rows of the table have zeros except for families with children. This is the result of our selection criterion. The contents of the column titled 'Base Average FA' were created from the expression *deltacon/units*. The user-defined variable *totalfa* is the sum of federal and provincial family allowances.

Focussing our attention on the first row of Table 1U, we see that even though single parent census families on average received $708 in combined federal/provincial family allowances they lost only $627 in consumable income as a result of eliminating benefits. The $81 difference is accounted for by the reduction in taxable income and, consequently, taxes paid. Therefore, single parent families receive, on average, an after tax benefit from federal and provincial family allowances of $627. The $81 change in consumable income is actually accounted for by a mix of income and commodity taxes. The last two columns split the effective tax into its two components. Note that a portion of the effective tax will be affected by changes in

other entitlements as a result of eliminating family allowances. For example, child tax credit benefits would be slightly higher due to the lower incomes without family allowances.

The second row of Table 1U gives results for two adult nuclear families. Two adult families have higher average incomes and so have higher marginal tax rates. Consequently, while their average family allowances are significantly higher than single parents, their average net benefit is slightly lower.

Table 2U: Selected Quantities for Nuclear Families by Base disposable income group

Base disposable income group	Mean Change: Disposable Income	Avg. children per family	Census Families	SCF Records
Min-5000	-616	1.51	26.3	8
5001-10000	-649	1.50	162.6	24
10001-15000	-793	1.63	374.4	53
15001-20000	-782	1.84	256.1	41
20001-25000	-736	1.68	281.9	47
25001-30000	-745	1.83	412.3	68
30001-35000	-790	2.06	432.8	77
35001-40000	-549	1.77	387.6	67
40001-45000	-652	1.89	476.2	83
45001-Max	-458	2.12	1530.8	256
All	-622	1.91	4341.1	724

Examining Table 2U we note that the distribution of the mean change in disposable income in the first column does not decrease monotonically with increasing income. The fluctuations can be explained by the number of children for whom benefits were paid. Note also that while there are only ten income groups, the underlying sample size is 8 for the Min - $5,000 income group. In general, attention to sample size is required as the number of records in each cell of a table can get small very quickly as the total number of cells increases. Had this example been run with the full sample however, the record counts would have been about twenty times those as shown in Table 2U.

SESSION 3: CHILD BENEFIT TRIAL SIMULATION

This example, which is included here for purely illustrative purposes, shows the steps that a user would take to perform the following analysis:

1. Eliminate Federal Family Allowances

2. Increase the Child Tax Credit basic amount to leave total consumable income unchanged (revenue neutrality).

3. Assess the effects on the Federal and Provincial Treasuries.

4. Assess the effects in terms of progressivity.

The first task in performing this analysis is to locate the tax/transfer algorithm parameters relevant to family allowances and the child tax credit. This is normally done by consulting the ***Parameter Guide***. However, the parameters are also listed by category in Appendix A of the printed document. The family allowance parameters are found in the government transfer category and look as follows.

Family Allowance	
FAFLAG	Family allowance flag
PFACFLAG	Use provincial configuration flag
	All Provinces Except Alberta and Québec
STDFA	Standard federal family allowance per child
Alberta	
AFAC1	Alberta FA benefit per child aged 0 – 6
AFAC2	Alberta FA benefit per child aged 7 – 11
AFAC3	Alberta FA benefit per child aged 12- 15
AFAC4	Alberta FA benefit per child aged 16- 17
Québec	
QFATFLAG	Make Provincial FA to 16 & 17 year olds taxable
QFFSL	Federal family allowance: Quebec configuration
QFS	Federal supplement per child 12-17 on Quebec family allowance
QFPSL	Quebec provincial family allowance
QAARCFLAG	Availability allowance: refundable tax credit flag
QAARC	Quebec availability allowance (refundable credit)
QAAFAFLAG	Availability allowance: supplement to Quebec FA flag
QAAFA	Quebec availability allowance (supplement)
QNBFAFLAG	Quebec newborn family allowance flag
QNBFA	Quebec newborn family allowance
Repayment (through tax system)	
FATBPI	Family allowance take-back phase in
FATD	Family allowance turndown income
FARR	Family allowance repayment rate

And two pages later the child tax credit parameters are listed as follows.

Federal Child Tax Credit	
CTCOPT	Federal child tax benefits calculation option
CTCPC	Child tax credit per child
CTCTD	Family income child tax credit turn down
CTCRR	Child tax credit reduction rate
CTCIFLAG	Child tax credit social assistance income inclusion flag
CTCERF	CTC child care expense reduction fraction
CTCREF	CTC post-reform rules flag
CTCSUP	CTC young child supplement
CTCTUR	CTC take-up rate table
CTCINC	CTC family income scaling factor

The parameters to be changed have been identified but their new values still need to be determined. The elimination of the federal Family Allowance program should

pose no problem, since this can be effected by setting all of the relevant parameters to zero. The parameter QFPSL, since it represents an extra Provincial contribution above and beyond the Federal Family Allowance, will be left unchanged. The FAFLAG parameter will not be changed because if it were set to 0 then provincial family allowances in Quebec would not be calculated. Evidently the parameter CTCPC must be increased, but the amount of increase required for "consumable income neutrality" is not clear. An iterative approach, involving more than one SPSM program run, will be required. The strategy for accomplishing this is as follows:

Step 1. We shall do the analysis using the 1992 tax/transfer system, and 1992 demography. This eliminates any need to project the values of or "grow" money items. (The overall results can be used as the basis for estimating the impacts in other years. Alternatively, growth factors, tax/transfer parameters and weights for the desired target year could be used in a subsequent study to refine the overall results.)

Step 2. Perform an SPSM program run with base results for the 1992 system and variant results with federal Family Allowances eliminated and the Child Tax Credit amount (CTCPC) doubled. Create the variant results file FACTC1.MRS. We shall call this run FACTC1, and run it using the 5% sample.

Step 3 Perform a second SPSM program run, similar to the FACTC1 run, except that the base results are read from the results file FACTC1.MRS and the variant results are based on the same parameter set except that CTCPC is increased by a further 10 dollars. We will call this run FACTC2.

Step 4. Examine the total amount on the line labeled "Change in Consumable Income" in the table output file for the FACTC2 run. This number will be directly attributable to the 10 dollar increase in CTCPC, since that was the only tax/transfer parameter that was changed. The difference divided by 10 (i.e. the derivative) is the amount by which total consumable income (measured in millions of dollars) will increase if we increase CTCPC by 1 dollar.

Step 5. Examine the total amount on the line labeled "Change in Consumable Income" in the table result file for the FACTC1 run. This number must be brought to zero to obtain neutrality with respect to consumable income in the 1992 tax/transfer system. Dividing this difference by the rate calculated in step 4 yields an estimate of the amount by which CTCPC must be changed to get revenue neutrality.

Step 6. Perform a final run (FACTC3), with the revised value of CTCPC calculated in Step 5. (This run will only be approximately neutral with respect to total consumable income.) Examine the resulting tables (FACTC3.TBL) to determine the redistributive effects by province and income.

In summary, three distinct SPSM runs will be performed. The FACTC1 run makes a

rough guess about CTCPC. The FACTC2 run computes the effect on consumable income of changing CTCPC by 1 dollar. The FACTC3 run uses a refined estimate of CTCPC using the derivative deduced from the FACTC2 run. The following table summarizes the three runs.

Run Name	Base Results (file)	Variant Results (file)
FACTC1	Standard 1992 (ba92.mpr)	1992, No FA, Double CTC (factc1.mpr)
FACTC2	1992, No FA, Double CTC (factc1.mrs)	1992, No FA, Double CTC plus $10 (factc2.mpr)
FACTC3	Standard 1992 (ba92.mpr)	Final CTC estimate (factc3.mpr)

We will now proceed with the FACTC1 run.

```
[1]     C:\SPSMTEST> SPSM
                              Welcome to the Statistics Canada

                          Social Policy Simulation Database / Model
                                       ( SPSD / M )
                            Program Version                 : 8.00
                          Database Adjustment Algorithm   : Standard
                       Standard Tax/Transfer Algorithm : Version 8.0: 84-03
                           Alternate Tax/Transfer Algorithm: none/aucun
                        Compiler / Operating System     : MSC 12.0 / WIN/NT

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                               Welcome to the Statistics Canada

                             Social Policy Simulation Database / Model
                                           ( SPSD / M )

                     Program Version                 : 8.0
                     Database Adjustment Algorithm   : Standard adjustment
                     Standard Tax/Transfer Algorithm : Version 8.0 : 84-03
                     Alternate Tax/Transfer Algorithm: none/aucun
                     Compiler / Operating System     : MSC 12.0 / WIN/NT

                     Copyright (c) Minister of Industry
                                        1984 – 2000

           Press 'F1' for context-specific help.
           Press Ctrl-Break to terminate.
           ======================= Control Parameters ======================
[2]        Enter name of input control parameter file ==> /spsd/ba92t.cpr
           Loading control parameters from '/spsd/ba92t.cpr'

[3]        Enter specification for generating output files ==> factc1
           Generating default output file names.
```

1. The current directory should be \SPSMTEST and the SPSM is invoked as usual.

2. We shall start by reading the 1992 default parameter file.

3. As discussed earlier, the name of this first program run will be FACTC1.

```
      Current values of selected control parameters:
       CPRDESC      Tax/transfer:1992 Population:1992 Incomes:1992 (1992$) [5%]
       LICENSEE     Statistics Canada    # SPSD/M licensee
      Selection/Sample
       SELFLAG             0             # Selection facility activation flag
       SAMPLEREQ     1.000000000         # Size of sample requested
       Input Databases
       INPSPD       $SPSD/v80y96t.spd    # Name of SPSD file (in)
       INPFXV       $SPSD/v80y96t.fxv    # Name of FAMEX vector file (in)
       INPWGT       $SPSD/v80y92t.wgt    # Name of weight file (in)
      Growth
       INPAPR       $SPSD/ba96_92.apr    # Name of database adjustment
                                           parameter file
      Scenario Control <no base, variant computed using parms>
       BASMETH             0             # Method of creating base variables
       VARMETH             2             # Method of creating variant
                                           variables
[4]    INPVARMPR    $SPSD/ba92.mpr       # Name of variant tax/transfer
      Output Files
       OUTMRSFLAG          0             # Variant results file creation flag
       OUTCPR          factc1.cpr         # Name of control parameter file
                                           (out)
[5]   Do you wish to modify any control parameters ? ==> y
```

4. By default variant results will be produced using the 1992 default tax/transfer parameters found in the file `/spsd/ba92.mpr`. These are the settings we shall use.

5. We shall now proceed to edit the control parameters for the `FACTC1` run.

```
[6]    ==> cprdesc      Description of SPSM run [string]
       CPRDESC ==> Base vs. No Federal FA, double CTCPC, 5% sample
[7]    ==> basmeth      Method of creating base variables
[8]    BASMETH ==> 2
       ==> inpbasmpr      Name of base tax/transfer parameter file (in) [string]
       INPBASMPR ==> /spsd/ba92.mpr
       ==> outmrsflag      Variant results file creation flag
[9]    OUTMRSFLAG ==> 1
       ==> uvarflag
              Activate UVAR parameter for expressions
       UVARFLAG ==> 1
       ==> uvar
       UVAR ==>
            User statements [string]
[10]   [01] deltacon=immicons - _immicons;
       [02] label(deltacon)="Change in Consumable Income";
[11]   deltacon=immicons - _immicons;
       label(deltacon)="Change in Consumable Income";
```

6. The CPRDESC parameter is changed as usual.

7. The default setting for this parameter is 0 which causes no base results to be either calculated or read from a file. We shall set it to 2 and cause base results to be calculated using the standard tax/transfer algorithm.

8. Whenever `BASMETH` is set to `2` the `INPBASMPR` parameter must also have a value. We shall want the base results to reflect the 1992 tax/transfer system with no changes so we select the default 1992 tax/transfer parameter file.

9. We can save time in the subsequent run by creating a variant results file. Since consumable income is the only variable we shall be initially comparing between scenarios we will use the default which is already set to *immicons* in the OUTVARMRS parameter (see previous page).

10. The final measure of interest to us is the change in consumable income. Here the base results value is being subtracted from the variant results value to create a user-defined variable called deltacon.

11. The new user variable is now appropriately labeled.

```
[12]   ==> xtflag      X-tab facility activation flag
       XTFLAG ==> 1
       ==> xtspec      X-tab specification [string]
[13]   XTSPEC ==>
       [01] CF: {_immicons:L="Base Consumable Income",
       [02]       immicons:L="Variant Consumable Income",
       [03]       deltacon};

       CF: {_immicons:L="Base Consumable Income",
             immicons:L="Variant Consumable Income",
             deltacon};
       ==> go
       No files will be overwritten with these control parameters.
       Any further control parameter changes ? ==> n
       Writing out control parameters to 'factc1.cpr'.
[14]   ================== Database Adjustment Parameters =================
```

```
[15]   Loading database adjustment parameters from '$SPSD/ba96_92.apr'
       Current values of selected database adjustment parameters:
        GFISENF        10       # Growth Factor: Self-employed income -non
          0.87580
          0.96300
          0.92010
          0.84940
          0.91630
          0.87010
          0.87730
          0.82230
          0.91340
          0.91060
      GFIEMP        10                 # Growth Factor: Employment income
          0.94650  0.94650
          0.93010  0.93010
          1.04530  1.04530
          0.96480  0.96480
          0.98370  0.98370
          0.98810  0.98810
          1.01400  1.01400
          0.94660  0.94660
          0.98180  0.98180
          0.97890  0.97890

      Do you wish to modify any database adjustment parameters ? ==> y
      ==> mprdesc
      ========================== Tax/Transfer Parameters ========================

      Loading base    tax/transfer parameters from '$SPSD/ba92.mpr'
      Loading variant tax/transfer parameters from '$SPSD/ba92.mpr'
      Current values of selected variant tax/transfer parameters:
       MPRDESC      Current values for 1992
       CTFLAG              1             # Commodity tax activation flag
       CTOPT               2             # Commodity tax calculation method
       CTDFLAG             0             # Commodity tax detailed calculation flag
       TARGETYEAR       1992             # Year of analysis
       PEROPT              2             # Personal exemption/credit option
       QREFOPT             2             # Quebec deduction/credit option

[16]   Do you wish to modify any variant tax/transfer parameters ? ==> y
```

12. We will create a table which specifies the exact information we need. To do this we activate the X-tab facility by setting this parameter to 1.

13. It is good practice to indent each line of a multi-line parameter using a tab or spaces. This makes the parameter much easier to read in a text editor. The parameter specification should be typed exactly as shown. The parameter specifies a table having three rows corresponding to base consumable income, variant consumable income, and the difference.

14. We are now ready to proceed to the next phase of the user dialogue.

15. No database adjustment parameters need to be changed for this example.

16. We will want to modify the variant tax/transfer algorithm parameters so the appropriate response is y . Notice that the base parameters are loaded first, if requested, but they cannot be edited in the user dialogue session. Only

variant parameters can be edited during the user dialogue.

```
[17]   ==> mprdesc      Description of tax/transfer parameter file
       MPRDESC ==> ba92t, No Federal FA, CTC*2
       ==> stdfa      Standard federal family allowance per child
       STDFA ==> 0
       ==> afac1      Alberta FA benefit per child aged 0 - 6
[18]   AFAC1 ==> 0
       ==> afac2      Alberta FA benefit per child aged 7 - 11
       AFAC2 ==> 0
       ==> afac3      Alberta FA benefit per child aged 12- 15
       AFAC3 ==> 0
       ==> afac4      Alberta FA benefit per child aged 16- 17
       AFAC4 ==> 0
       ==> qfs      Federal supplement per child 12-17 on Quebec family al
       QFS ==> 0
       ==> read
       Name of file to read ==> \spsm\example\QFFSL.MPI
[19]   parameter QFFSL updated from file
       ==> ctcpc      Child tax credit per child
       CTCPC ==> 1202
[20]   ==> go
       Writing out changed tax/transfer parameters to 'factc1.mpr'.
       Changing INPVARMPR from '$SPSD/ba92.mpr' to 'factc1.mpr'

       ================================== Execution ==============================

        SPSM          started   on Tue Jun 13 11:11:54 2000
        SPSM          completed on Tue Jun 13 11:11:58 2000
        Elapsed time= 00:00:04
        Number of households processed=  3551
        Number of persons     selected= 10353
        Variant consumable income ($000,000):   348060.8
        Increase from base        ($000,000):     1898.6
        Control parameter file . . . . . factc1.cpr
        Table output file  . . . . . factc1.tbl
        Variant tax/transfer parameter file  . factc1.mpr
        Variant results file . . . . . factc1.mrs
```

17. A descriptive label of the variant results is given as usual.

18. At this point all of the parameters identified earlier must have their values set to 0. The federal family allowances are `turned-off' first, followed by the specific Alberta and Quebec federal family allowance configurations.

19. Quebec family allowances vary by the number of children. The settings for this table parameter are contained in the file `\SPSM\EXAMPLE\QFFSL.MPI`. It is read in here to save the user the trouble of editing all the entries of this table lookup parameter.

20. The last parameter to change is the doubling of child tax credit benefits. The model execution is then initiated with the `` `go' `` command.

The following is a listing of the contents of the table result file for the `FACTC1 run, factc1.tbl`.

```
                              SPSD/M (Version 8.00)
                    Base Description: Current values for 1992
                 Variant Description: ba92t, No Federal FA, CTC*2
                        Sample: 0.0505  AGENAME='Standard'

Table 1U: Selected Quantities for Census Families

+--------------------------------+---------+
|Base Consumable Income (M)      | 346162.1|
|Variant Consumable Income (M)   | 348060.8|
|Change in Consumable Income (M) |   1898.6|
+--------------------------------+---------+
```

Examine the total amount on the line labeled "Change in Consumable Income" above. This number must be brought to zero to obtain neutrality with respect to consumable income in the 1992 tax/transfer system. Here we see that our changes have resulted in a 1898.6 million dollar increase in consumable income, (the increase in the child tax credit was somewhat excessive). Obviously the number will have to be adjusted downward by some amount.

This completes Step 2 of the analysis plan previously outlined. Part 3 of the plan, (and the second SPSM run), involves an increase in CTCPC by $10 to work out the relationship between an increase in CTCPC and the corresponding increase in consumable income. Both the base and variant scenarios in this run will use the 1992 tax/transfer system with no federal family allowances. The only difference between them will be the value of the child tax credit per child. At this point you should invoke the SPSM as usual.

```
      C:\SPSMTEST> SPSM
                              Welcome to the Statistics Canada

                         Social Policy Simulation Database / Model
                                      ( SPSD / M )
                            Program Version                 : 8.0
                          Database Adjustment Algorithm   : Standard
                     Standard Tax/Transfer Algorithm : Version 8.0: 84-03
                         Alternate Tax/Transfer Algorithm: none/aucun
                      Compiler / Operating System     : MSC 12.0 / WIN/NT

                               Copyright (c) Minister of Industry
                                        1984 – 2000
      Press 'F1' for context-specific help.
      Press Ctrl-Break to terminate.
      ======================= Control Parameters =======================
[21]    Enter name of input control parameter file ==> factc1.cpr
        Loading control parameters from 'factc1.cpr'

        Enter specification for generating output files ==> factc2
        Generating default output file names.
```

21. We will start with the control parameter settings established in the FACTC1 run. Many of the settings will be the same for this run and we shall save time editing the parameters. For example, we shall be using the same user-defined variable and X-tab specification. Output files will be based on the name FACTC2.

```
[22]  Current values of selected control parameters:
       CPRDESC      Base vs. No Federal FA, double CTCPC, 5% sample
       LICENSEE     Statistics Canada    # SPSD/M licensee
      Selection/Sample
       SELFLAG             0             # Selection facility activation flag
       SAMPLEREQ     1.000000000         # Size of sample requested
       Input Databases
       INPSPD       $SPSD/v80y96t.spd    # Name of SPSD file (in)
       INPFXV       $SPSD/v80y96t.fxv    # Name of FAMEX vector file (in)
       INPWGT       $SPSD/v80y92t.wgt    # Name of weight file (in)
      Growth
       INPAPR       $SPSD/ba96_92.apr    # Name of database adjustment
                                           Parameter file
      Scenario Control <no base, variant computed using parms>
       BASMETH             2             # Method of creating base variables
       INPBASMPR     $SPSD/ba92.mpr      # Name of base tax/transfer parameter file
       VARMETH             2             # Method of creating variant variables
       INPVARMPR        factc1.mpr       # Name of variant tax/transfer
      Output Files
       OUTMRSFLAG          1             # Variant results file creation flag
       OUTMRSVARS      immicons          # Variant results file variables
       OUTVARMRS       factc2.mrs        # Name of variant results file (out)
       OUTCPR          factc2.cpr        # Name of control parameter file (out)
      Do you wish to modify any control parameters ? ==> y
```

22. The values of the selected parameters are the same as for the FACTC1 run as expected. The output files are correctly named for this run.

```
[23]   ==> cprdesc      Description of SPSM run [string]
       CPRDESC ==> No Federal FA, Double CTC,  vs. same with CTC + $10
       ==> basmeth      Method of creating base variables
[24]   BASMETH ==> 1
       ==> inpbasmrs      Name of base results file (in) [string]
[25]   INPBASMRS ==> factc1.mrs
       ==> inpvarmpr      Name of variant tax/transfer parameter file (in)
[26]   INPVARMPR ==> factc1.mpr
       ==> outmrsflag      Variant results file creation flag
[27]   OUTMRSFLAG ==> 0
[28]   ==> go
       No files will be overwritten with these control parameters.
       Any further control parameter changes ? ==> n
       Writing out control parameters to 'factc2.cpr'.
```

23. The CPRDESC parameter is changed as usual.

24. Base results were calculated in the FACTC1 run. In this FACTC2 run results will be read from a results file.

25. The results file created with variant variables in the FACTC1 run is specified as input for base results in this run.

26. The variant scenario will use the same set of parameters as was used to create consumable income in the FACTC1.MRS file. We will be editing this file's contents in the third phase of the user dialogue.

27. We will not be requiring a results file for this set of variant results so the OUTMRSFLAG parameter is set to 0. The OUTVARMRS and OUTMRSVARS parameter can be left as they are.

28. We can now proceed to the next stage of the dialogue.

```
Loading database adjustment parameters from '$SPSD/ba96_92.apr'
Current values of selected database adjustment parameters:
 GFISENF        10       # Growth Factor: Self-employed income –non
  0.87580
  0.96300
  0.92010
  0.84940
  0.91630
  0.87010
  0.87730
  0.82230
  0.91340
  0.91060
GFIEMP        10                 # Growth Factor: Employment income
  0.94650  0.94650
  0.93010  0.93010
  1.04530  1.04530
  0.96480  0.96480
  0.98370  0.98370
  0.98810  0.98810
  1.01400  1.01400
  0.94660  0.94660
  0.98180  0.98180
  0.97890  0.97890


[29]  Do you wish to modify any database adjustment parameters ? ==> n
      ==================== Tax/Transfer Parameters ==================
      Loading variant tax/transfer parameters from 'factc1.mpr'
      Current values of selected variant tax/transfer parameters:
       MPRDESC      ba92t, No Federal FA, CTC*2
       CTFLAG               1             # Commodity tax activation flag
       CTOPT                2             # Commodity tax calculation method
       CTDFLAG              0             # Commodity tax detailed calculation flag
       TARGETYEAR       1992              # Year of analysis
       PEROPT               2             # Personal exemption/credit option
       QREFOPT              2             # Quebec deduction/credit option
[30]  Do you wish to modify any variant tax/transfer parameters ? ==> y
      ==> mprdesc      Description of tax/transfer parameter file
[31]  MPRDESC ==> No federal FA, Double CTC plus $10
      ==> ctcpc      Child tax credit per child
[32]  CTCPC ==> 1212
```

29. No database adjustment will be performed in any of the program runs in this tutorial session.

30. Even though we read the tax/transfer parameters from the `FACTC1` run we must still increase the child tax credit per child.

31. Good SPSM practice is again followed by keeping the file documentation up to date.

32. The `CTCPC` parameter is increased by ten dollars to $1212 in this run.

```
[33]   ==> go
       Writing out changed tax/transfer parameters to 'factc2.mpr'.
       Changing INPVARMPR from 'factc1.mpr' to 'factc2.mpr'

       ================================== Execution ==============================

        SPSM          started   on Tue Jun 13 11:24:15 2000
        SPSM          completed on Tue Jun 13 11:24:16 2000
        Elapsed time= 00:00:01
        Number of households processed=  3551
        Number of persons     selected= 10353
[34]    Variant consumable income ($000,000):   348128.5
        Increase from base        ($000,000):       67.7
        Control parameter file . . . . . . . factc2.cpr
        Table output file  . . . . . . . . . factc2.tbl
        Variant tax/transfer parameter file  . factc2.mpr
```

33. This completes the setting of the parameters required for our FACTC2 run and we now proceed to the execution phase.

34. The increase in consumable income shown here will be slightly different than the corresponding figure in the output table file. This disagreement is smaller than rounding error and is caused by slightly different means of applying weights to the estimates.

The following is a listing of the first table in the FACTC2.TBL file created by the SPSM run.

```
                              SPSD/M (Version 8.00)
                   Base Description: ba92t, No Federal FA, CTC*2
                Variant Description: No federal FA, Double CTC plus $10
                      Sample: 0.0505  AGENAME='Standard'

Table 1U: Selected Quantities for Census Families

+--------------------------------+---------+
|Base Consumable Income (M)      | 348060.8|
|Variant Consumable Income (M)   | 348128.5|
|Change in Consumable Income (M) |     67.7|
+--------------------------------+---------+
```

The table reveals that consumable income increased by $67.7 million over the FACTC1 run. Since the CTCPC parameter was increased by $10, this means that each $1 increase in CTCPC results in an increase of $6.77 million in consumable income. Thus, to eliminate the $1898.6 million overshoot of the FACTC1 run, we should decrease CTCPC by 1898.6/6.77 = 280.44 dollars. Since the FACTC1 run had CTCPC set at $1202, our new estimate for CTCPC (for the next run, FACTC3) should be $921.56 ($1202 less $280.44).

The following is a listing of the include file \spsm\example\eg3xtab.cpi which will be read by SPSM during the FACTC3 run.

```
####
##eg3xtab.cpi - Include file for Tutorial Session 3
##
##$Id$
##
##Purpose: This file contains the necessary control parameters to
##         create user defined variables and create a custom table
##         using the X-tab facility.  The explanation of the
##         parameters may be found in the Introduction and Overview
##         guide under tutorial session number 3.
##
################################################################################

UVARFLAG            1
UVAR
deltacon=immicons - _immicons;
label (deltacon)="Change in Consumable Income";
deltafb=imfedbal - _imfedbal;
label (deltafb)="Federal Net Balance Increase";
deltapb=imprvbal - _imprvbal;
label (deltapb)="Provincial Net Balance Increase";
iconsgrp=split(_immicons,5000,10000,15000,20000,
                         25000,30000,35000,40000,45000);
label (iconsgrp)="Base Consumable Income Group";

XTFLAG         1
XTSPEC
CF: hdprov+ * {deltafb, deltapb, deltacon};
CF: iconsgrp+ * {deltacon: L="Change in Consumable Income"};
```

This include (`.cpi`) file is designed to produce results which will allow us to assess the impact of our changes on the progressivity of income distribution and on federal and provincial treasuries. The three user-defined variables correspond to each of these items of interest. The simple X-tab specification is all we will need to perform the final analysis.

We can now proceed with the final SPSM run in this example. The program is invoked as usual.

```
C:\SPSMTEST> SPSM
                        Welcome to the Statistics Canada

                    Social Policy Simulation Database / Model
                                 ( SPSD / M )
                       Program Version                 : 8.0
                Database Adjustment Algorithm   : Standard adjustment
                 Standard Tax/Transfer Algorithm : Version 8.0: 84-03
                     Alternate Tax/Transfer Algorithm: none/aucun
                  Compiler / Operating System     : MSC 12.0 / WIN/NT

                          Copyright (c) Minister of Industry
                                       1984 – 2000
 Press 'F1' for context-specific help.
 Press Ctrl-Break to terminate.
 ======================= Control Parameters =======================
Enter name of input control parameter file ==> /spsd/ba92t.cpr
Loading control parameters from '/spsd/ba92t.cpr'

Enter specification for generating output files ==> factc3
Generating default output file names.
```

The FACTC3 run will start with the default control parameter file for 1992.

The filenames of the different types of output file will be FACTC3.

```
[37]  Current values of selected control parameters:
       CPRDESC      Tax/transfer:1992 Population:1992 Incomes:1992 (1992$) [5%]
       LICENSEE     Statistics Canada    # SPSD/M licensee
      Selection/Sample
       SELFLAG             0             # Selection facility activation flag
       SAMPLEREQ     1.000000000         # Size of sample requested
       Input Databases
       INPSPD       $SPSD/v80y96t.spd    # Name of SPSD file (in)
       INPFXV       $SPSD/v80y96t.fxv    # Name of FAMEX vector file (in)
       INPWGT       $SPSD/v80y92t.wgt    # Name of weight file (in)
      Growth
       INPAPR       $SPSD/ba96_92.apr    # Name of database adjustment
                                           Parameter file
      Scenario Control <no base, variant computed using parms>
       BASMETH             0             # Method of creating base variables
       VARMETH             2             # Method of creating variant variables
       INPVARMPR    $SPSD/ba92.mpr       # Name of variant tax/transfer
      Output Files
       OUTMRSFLAG          0             # Variant results file creation flag
       OUTCPR          factc3.cpr         # Name of control parameter file (out)
      Do you wish to modify any control parameters ? ==> y
```

37. The FACTC3 run will require new base/variant settings, a new set of reporting variables and a new X-tab specification.

```
[38]   ==> cprdesc      Description of SPSM run [string]
       CPRDESC ==> 1992 Base vs. No Federal FA, CTCPC to $922.08, 5% sample
[39]   ==> basmeth      Method of creating base variables
       BASMETH ==> 2
       ==> inpbasmpr      Name of base tax/transfer parameter file (in) [s
       INPBASMPR ==> /spsd/ba92.mpr
       ==> inpvarmpr      Name of variant tax/transfer parameter file (in)
[40]   INPVARMPR ==> factc1.mpr
[41]   ==> read
       Name of file to read ==> \spsm\example\eg3xtab.cpi
       parameter UVARFLAG updated from file
       parameter UVAR updated from file
       parameter XTFLAG updated from file
       parameter XTSPEC updated from file
[42]   ==> go
       No files will be overwritten with these control parameters.
       Any further control parameter changes ? ==> n
       Writing out control parameters to 'factc3.cpr'.
```

38. As usual we will provide some documentation for the FACTC3.CPR file.

39. The base results should be calculated as the 1992 tax/transfer system in the same was as the FACTC1 run.

40. The tax/transfer parameters for variant results can be initially read from the FACTC1.MPR file created in the FACTC1 run. We shall make a subsequent modification to the value of CTCPC in this file in the tax/transfer parameter editing phase of the dialogue.

41. The settings from the include file for the user-defined variables and the X-tab

specification are read in at this point. The XTFLAG parameter is set to 1 in this file to ensure that a custom table will be produced.

42. Changes to the control parameters for the FACTC1 run are now complete and we can proceed to the next phase of the dialogue.

```
Loading database adjustment parameters from '$SPSD/ba96_92.apr'
Current values of selected database adjustment parameters:
 GFISENF        10       # Growth Factor: Self-employed income -non
   0.87580
   0.96300
   0.92010
   0.84940
   0.91630
   0.87010
   0.87730
   0.82230
   0.91340
   0.91060
GFIEMP         10                  # Growth Factor: Employment income
   0.94650  0.94650
   0.93010  0.93010
   1.04530  1.04530
   0.96480  0.96480
   0.98370  0.98370
   0.98810  0.98810
   1.01400  1.01400
   0.94660  0.94660
   0.98180  0.98180
   0.97890  0.97890


[43]  Do you wish to modify any database adjustment parameters ? ==> n
      ==================== Tax/Transfer Parameters ====================
      Loading variant tax/transfer parameters from '/spsd/ba92.mpr'
      Loading variant tax/transfer parameters from 'factc1.mpr'
      Current values of selected variant tax/transfer parameters:
       MPRDESC      ba92t, No Federal FA, CTC*2
       CTFLAG               1             # Commodity tax activation flag
       CTOPT                2             # Commodity tax calculation method
       CTDFLAG              0             # Commodity tax detailed calculation flag
       TARGETYEAR        1992             # Year of analysis
       PEROPT               2             # Personal exemption/credit option
       QREFOPT              2             # Quebec deduction/credit option
[44]  Do you wish to modify any variant tax/transfer parameters ? ==> y
      ==> mprdesc      Description of tax/transfer parameter file
[45]  MPRDESC ==> FACTC3 variant: no federal FA, $921.56 CTCPC
      ==> ctcpc      Child tax credit per child
[46]  CTCPC ==> 921.56
```

```
[47]   ==> go
       Writing out changed tax/transfer parameters to 'factc3.mpr'.
       Changing INPVARMPR from 'factc1.mpr' to 'factc3.mpr'

       ================================== Execution ==============================

        SPSM          started   on Tue Jun 13 11:37:29 2000
        SPSM          completed on Tue Jun 13 11:37:32 2000
        Elapsed time= 00:00:03
        Number of households processed=  3551
        Number of persons     selected= 10353
        Variant consumable income ($000,000):   346224.8
        Increase from base        ($000,000):       62.6
        Control parameter file . . . . . . . . factc3.cpr
        Table output file  . . . . . . . . . . factc3.tbl
        Variant tax/transfer parameter file  . factc3.mpr
```

43. Database adjustment, as mentioned before, is not being used for this tutorial session.

44. We will need to modify the tax/transfer parameter file which was specified as `FACTC1.MPR`.

45. Correct file documentation is maintained as usual.

46. The only other tax/transfer parameter which will change is `CTCPC` (the value of the child tax credit per child). We will give it the value of $921.56 as determined earlier.

47. Having made all the specifications for this final run we can proceed to the execution of the simulation.

The following is a listing of the first user-specified X-tab table found in the `FACTC3.TBL` file.

SPSD/M (Version 8.00)
Base Description: Current Values for 1992
Variant Description: FACTC3 variant: no federal FA, $921.56 CTCPC
Sample: 0.0505 AGENAME='Standard'

Table 1U: Selected Quantities for Census Families by Province

Province	Federal Net Balance Increase (M)	Provincial Net Balance Increase (M)	Change in Consumable Income (M)
Newfoundland	6.4	-8.1	1.7
P.E.I.	-0.6	-1.6	2.2
Nova Scotia	11.5	-11.9	0.4
New Brunswick	4.6	-8.8	4.1
Quebec	89.3	-107.9	18.7
Ontario	113.4	-132.6	19.2
Manitoba	6.7	-17.4	10.7
Saskatchewan	11.9	-15.3	3.3
Alberta	14.8	-21.4	6.6
B.C.	41.3	-36.8	-4.4
All	299.2	-361.7	62.6

A number of features of our example scenario can be seen in Table 1U. The first obvious one is the effective transfer of about $299 million from Provincial Governments to the Federal Government, despite the overall neutrality of the scenario in terms of consumable income. This is a direct result of the elimination of the taxable Family Allowances. This elimination results in a decrease in provincial taxes, since taxable income has decreased. Quebec is an exception to this because Family Allowances are excluded from net income in that tax system in 1992. The increase in the Child Tax Credit does not affect provincial treasuries since that program is non-taxable. The varying impact of the change by province can also be seen.

Table 2U: Change in Consumable Income (M) for Census Families by Consumable income group

Base Consumable Income Group	Change in Consumable Income
Min-5000	-8.5
5001-10000	-6.7
10001-15000	-28.8
15001-20000	11.3
20001-25000	-2.1
25001-30000	29.4
30001-35000	-3.0
35001-40000	16.9
40001-45000	43.4
45001-Max	10.8
All	62.6

Table 2U shows the flows between income groups that the scenario produces. The results, which show middle income families gaining at the expense of mainly poorer ones, may seem at first surprising, since the Child Tax Credit is by design more progressive (being a refundable tax credit) than Family Allowances (a taxable demogrant). The difference can be explained by observing that the combined Child Tax Credit and Family Allowance per child, for those paying no tax, was $1020 in 1992. Our example scenario, on the other hand, decreased this amount to $921.56. The fact that higher income families lose is not surprising, since they lose Family Allowances and were ineligible for a Child Tax Credit both before and after the change. The low (5%) reduction rate together with the increased amount per child combine to make middle income families eligible for the credit.

A number of features of the SPSM model have been demonstrated in this example. The results, once examined and explained, tend to be easy to understand intuitively once one has grasped which tax/transfer programs are interacting, and how each of these interacting programs work. While the qualitative conclusions could be derived independently (perhaps with considerably more thought than the ten minutes required to run the model!), the SPSM model adds a quantitative dimension to the analysis. For playing around with ideas, the 5% model appears to be quite adequate and saves time.

SESSION 4: NEW EARNED INCOME TAX CREDIT SIMULATION

This final tutorial session shows a more advanced use of the SPSD/M in black box mode. It is not necessary to proceed with this example before conducting research with the SPSD/M. Those readers who are comfortable with the use of the model thus far are invited to try this last session.

In this session we will be testing the fiscal impacts on households and governments of introducing an earned income tax credit (EITC) program. The testing of a new program would normally be a glass box application requiring re-compilation of the model. However for certain types of programs the black box mode is adequate.

Specifically, these cases are where the new program has no implications for personal taxes and is not extremely complicated. The technique makes use of the user-defined variables and selection facility.

By now you should be familiar with the SPSM dialogue and status messages so the user dialogue will not be shown in this example. Instead we will show an example of how to use the SPSM in batch mode.

The earned income tax credit for this example has the following specifications. These specifications are not meant to represent a truly realistic earned income tax credit, but they are sufficiently close for the purposes of this example.

Eligibility:	Individuals aged 21 years or over are individually eligible if they reside in census families in which children under the age of 21 years are present.
Maximum Benefit:	Maximum benefits are $1,200 for each eligible person.
Income Test:	Income testing will be based on the employment income of an individual plus the employment income of their spouse if present.
Turning Points:	Benefits begin with the first dollar of earned income. At $8,000 dollars of employment income the benefits reach the maximum and continue at that level until $12,000 of earned income where they begin to be reduced.
Reduction Rates:	15% of earned income is payable as a benefit up to a maximum of $1,200. After $12,000 of earned family income maximum benefits are reduced by 10¢ for each additional dollar of earned income.

The above specifications can be represented by the following graph.

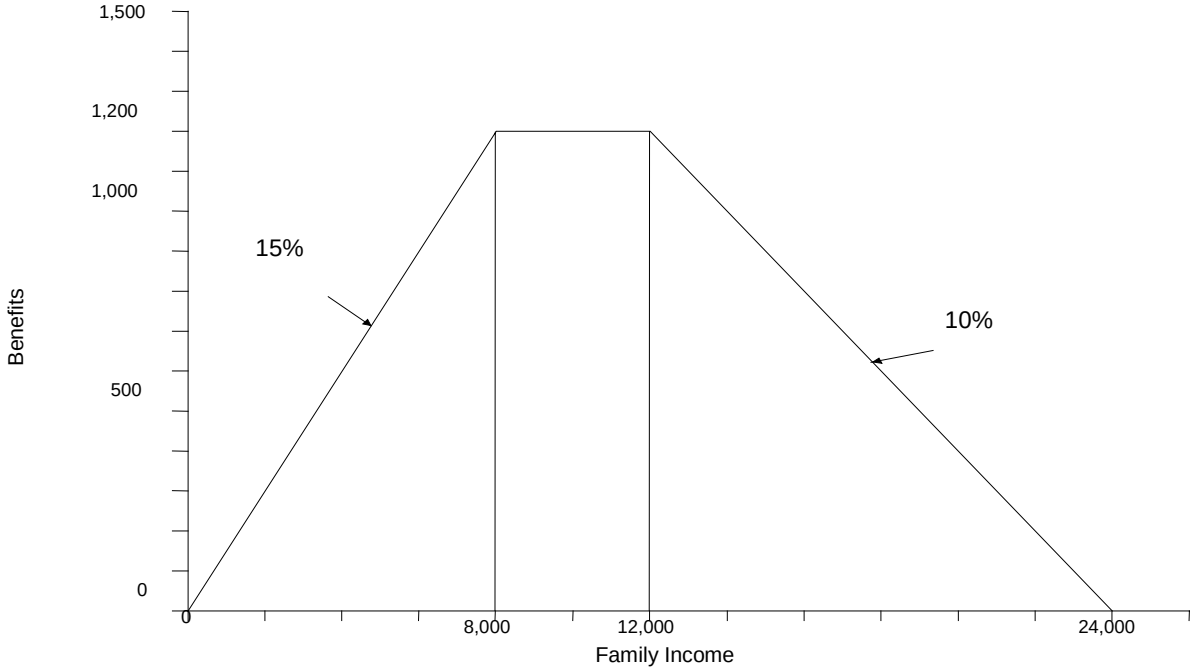


Figure 9. Earned Income Tax Credit Benefit Structure

The four figures presented on the following pages contain a listing of a file named `eitc.cpi` which will be used to perform the analysis. Numbered comments are used to explain the file's contents.

```
[1]    ####
       ##eitc.cpi – Include file for Tutorial Session 4
       ##
       ##$Id$
       ##
       ##Purpose: This file contains the necessary control parameters to simulate
       ##     a new earned income tax credit.  The description of this new
       ##     program and explanation of parameters is contained in the
       ##     Introduction and Overview Guide under the heading of Tutorial
       ##     Session 4.
       ##
       ############################################################ ###################

       ###
[2]    ## 2.1.7 Record selection facility
       ###

       SELFLAG             1             # Selection facility activation flag
       SELUNIT             2             # Selection facility family level
       SELSPEC                           # Selection specification
                   (idage < 21) && (idcfrh = 2)
```

1. The comment block at the beginning of the file provides information on the purpose of the file contents as well as the name of the file. These comment blocks are useful in parameter include files but should not be used in the parameter files themselves, because the SPSM will strip these block comments (lines starting with ##) from the output parameter file.

2. The selection facility will be used to perform a portion of the eligibility test. The selection level of analysis is set to census families (`SELUNIT=2`). The selection specification checks for individuals under the age of twenty-one whose relationship to the head of the census family is that of a child. As a result, only those census families with children under 21 will be selected. More precisely, if `SELSPEC` evaluates to zero for every member of a specific `SELUNIT` (a census family in this case) then that family will be rejected.

```
       ###
[3]    ## 2.1.9 User-defined Analysis Variables
       ###
       UVARFLAG    1
       UVAR
[4]    nfempinc=idiemp + SP:idiemp;
[5]    if (idage>=21) {
[6]    if (nfempinc<8000) {
             eitc = .15*nfempinc;
          }
[7]    else if (nfempinc<=12000) {
             eitc = 1200;
          }
```

```
[8]    else if (nfempinc<24000) {
             eitc = 1200-((nfempinc-12000)*.10);
          }
       }
       else {
          eitc=0;
       }
[9]    label(eitc)="Earned income tax credit";
```

The benefits are added up into one variable for reporting purposes.

3. The user-defined variable facility is used to simulate the EITC program. Keep in mind that each user-defined variable is evaluated sequentially at the individual level of analysis. Consequently expressions should not make reference to user variables that have not yet been defined.

4. *nfempinc* is the combined employment income of the head and the spouse of the census family which will be subsequently used for income testing. This is accomplished by specifying the employment income of the individual being processed(*idiemp),* plus the employment income of the spouse(SP:*idiemp),* using the modifier SP: to indicate the value of the variable should be read from the spouse.

5. Benefits will be restricted to individuals over the age of 20. This is accomplished by establishing a conditional group of statements with in the braces{}. See the *User's Guide* for more information on statements.

6. The EITC benefit payable to eligible individuals having a combined head/spouse employment income of less than $8,000 is then calculated as 15% of head plus spouse employment income. This is the first slope of the function. Note that zero employment income will result in zero benefits.

7. The maximum EITC benefit of $1,200 is then payable to eligible individuals having a combined head/spouse employment income of between $8,000 and $12,000.

8. The EITC benefit payable to eligible individuals having a combined head/spouse employment income of between 12,000 and 24,000 is then calculated as maximum benefits less 10% of employment income in excess of 12,000. This is the third and final slope of the function.

9. The variable *eitc* is then labelled.

```
[10]   dispinc=immdisp+eitc;
       label(dispinc)="Disposable Income";
[11]   gainer=eitc>0;
       label(gainer)="Received EITC Flag (Gainer)";
[12]   Nochange=(eitc==0);
       label(nochange)="Unaffected by EITC Flag";
[13]   agegrp=split(idage,20,64);
       label(agegrp)="Age";
[14]   Empigrp=split(idiemp,0,8000,12000,24000);
```

```
[15]   Dispgrp=split(immdisp,5000,10000,15000,20000,25000,
                          30000,35000,40000,45000);
       label (dispgrp)="Base disposable income group";
```

10. Because the definition of *immdisp* (disposable income) is not modifiable in black box mode we will need to create and label a new variable *(dispinc)* which shows disposable income after the new tax credit.

11. *gainer* is true (1) if the individual gained from the EITC. Otherwise the value is zero

12. *nochange* is true (1) if the individual was unaffected by the EITC. Otherwise the value is 0.

13. We want to examine the results across three different classification dimensions. These new variables allow us to validate the SPSM implementation of the new EITC program and to measure the distributive effects of that program. The *agegrp* variable breaks the sample into three groups according to age. These groups are use to produce custom Table 1U.

14. The *empigrp* variable has five different values depending on the level of employment income. This allows us to check that nobody is receiving benefits if family income is above the breakeven value for the EITC.

15. The *dispgrp* variable has ten different values depending on the level of disposable income. This allows us to examine the extent of progressivity of the EITC.

```
[16]   ###
       ## 2.1.15.1 Built-in tables
       ###

       T0FLAG              0             # Table 0 request flag

       ###
[17]   ## 2.1.15.2 User-specified Tabulation facility
       ###

       XTFLAG              1             # X-tab facility activation flag
       XTSPEC                            # X-tab specification
[18]   IN:{eitc, gainer:S=3, nochange:S=3} * agegrp+;
       IN:empigrp+ * {eitc, eitc/gainer:L="Average Benefits",
                      gainer:S=3, nochange:S=3};
       IN:dispgrp+ * {eitc, gainer:S=3, nochange:S=3, scfrecs};

       ###
```

```
[19]   ## 2.1.15.3 Distributional Analysis Facility
       ###

       DISTFLAG            1       # Distribution facility activation flag
       DISTUNIT            0       # Distribution facility family level
       DISTVAR          eitc       # Distribution facility variable
       DISTSAMP         3000       # Distribution facility sample size
       DISTZERO            0       # Distribution facility zero inclusion flag
       DISTP         10            # Breakpoints for histogram plot
                1
                5
               10
               20
               30
               40
               50
               60
               70
               99
```

16. The first built-in table, which is activated as a default in the `ba92t.cpr` file, is turned off here.

17. The X-tab facility is used to evaluate the impacts of the new program.

18. The specification shown here produces three tables. Note that the tables have been forced to be tabulated at the individual level of analysis (`IN:`). In this type of application where benefits are being calculated on an individual basis the user **may** specify a table request at a higher family level and all analysis variables will be rolled up to that level. **However**, the classification variables must be calculated for the desired family level of table. Thus for a NF: table the user would group NF:immdisp rather than immdisp. Also, the age would refer to the head of the nuclear family.

19. The distributional analysis facility is used to explore the shape of the distribution of new EITC benefits. The level of analysis is set to individual benefits (`DISTUNIT=0`). Because `DISTZERO` is set to `0`, individuals receiving no EITC benefits are excluded from the distributional report. The requested breakpoints (`DISTP`) are altered due to the truncated nature of the distribution.

This file can be found in the `\SPSM\EXAMPLE` directory. The whole SPSM run can be invoked in batch mode by typing the following command at the MS-DOS prompt.

```
SPSM \spsd\ba92t#eitc#y#read#\spsm\example\eitc.cpi#go#n#n#n
```

You will see the entire dialogue appear on the screen exactly as if you had typed the commands in response to the prompts. Let us now turn to briefly examine the outputs of the run which have been written to the `eitc.tbl` file.

Table 1U: Selected Quantities for Individuals by Age

	Age			
Quantity	Min-20	21-64	65-Max	All
Earned income tax credit (M)	0.0	1292.0	0.6	1292.6
Received EITC Flag (Gainer) (000)	0.0	1846.2	3.2	1849.5
Unaffected by EITC Flag (000)	9207.1	6821.9	30.7	16059.7

Table 1U seems to indicate that the program has been correctly implemented as specified. No benefits are paid to children aged 20 and under. Total benefits of $1.3 billion accrue to 1.8 million individuals. There are only 33,900 individuals over the age of 64. This is because the selection facility restricts the sample to census families having children under age 21. In total, only an estimated 17,909,200 (1849.5 + 16059.7) Canadians of any age live in such families in 1992.

Table 2U: Selected Quantities for Individuals by Wages & salaries Group

Wages & salaries Group	Earned income tax credit (M)	Average Benefits	Received EITC Flag (Gainer) (000)	Unaffected by EITC Flag (000)
Min-0	248.5	702.2277	353.9	9951.8
1-8000	519.3	657.8598	789.4	1482.1
8001-12000	279.9	1004.5182	278.7	369.2
12001-24000	244.8	572.6192	427.5	945.6
24001-Max	0.0	0.0000	0.0	3311.1
All	1292.6	698.8814	1849.5	16059.7

Table 2U shows the same results as Table 1U except they are now broken out by individual employment earnings level. As we would expect, no benefits are paid to individuals with over $24,000 of earned income. The $248.5 million in EITC benefits paid to individuals having no employment income appears to be an error. Recall, however, that the program as specified is based on family employment income. This means that if an employed person earning between $1 and $24,000 had a non-working spouse, that spouse would be eligible for individual benefits. It is apparent that this version of the EITC is not a pure individual work incentive program.

Notice that the average benefits for the 8001-12000 employment income group is $1,005. Some readers may have expected the number to be $1,200, or maximum benefits. This would be the case if the table were restricted to unattached individuals. Again, this is not the case as the table is based on the income of individuals but the benefits are based on family employment income. The $1,005 is short of the maximum due to married couples who have more than one earner and whose combined income is less than 24,000. In these cases the income of the second earner moves the family employment income into the range where benefits are reduced.

Table 3U: Selected Quantities for Individuals by Base Disposable Income Group

Base disposable income group	Earned income tax credit (M)	Received EITC Flag (Gainer) (000)	Unaffected by EITC Flag (000)	SCF Records
Min-5000	141.4	252.6	9674.2	1649
5001-10000	263.2	346.7	836.9	182
10001-15000	369.1	488.9	940.2	241
15001-20000	281.9	393.3	786.6	211
20001-25000	118.1	187.5	990.6	197
25001-30000	68.9	96.9	735.9	146
30001-35000	23.4	29.3	690.8	123
35001-40000	6.6	22.1	526.8	88
40001-45000	0.3	6.9	407.9	67
45001-Max	19.5	25.4	469.8	81
All	1292.6	1849.5	16059.7	2984

Table 3U shows the distribution of EITC benefits over individuals by disposable income group. Benefits are paid to persons with high incomes because sources of income other than from employment are not being taken into account in determining benefits.

Distribution report: Earned income tax credit for Individuals

Total observations = 6703
Zero observations = 5726
The following statistics are based on 977 non-zero observations.

Descriptive Statistics:

Sum of weights = 1849498
Weighted Sum = 1292579751
Weighted Sum of Squares = 1177196838887
Weighted Mean = 699

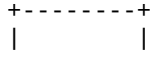
Extreme Values (with associated household numbers):

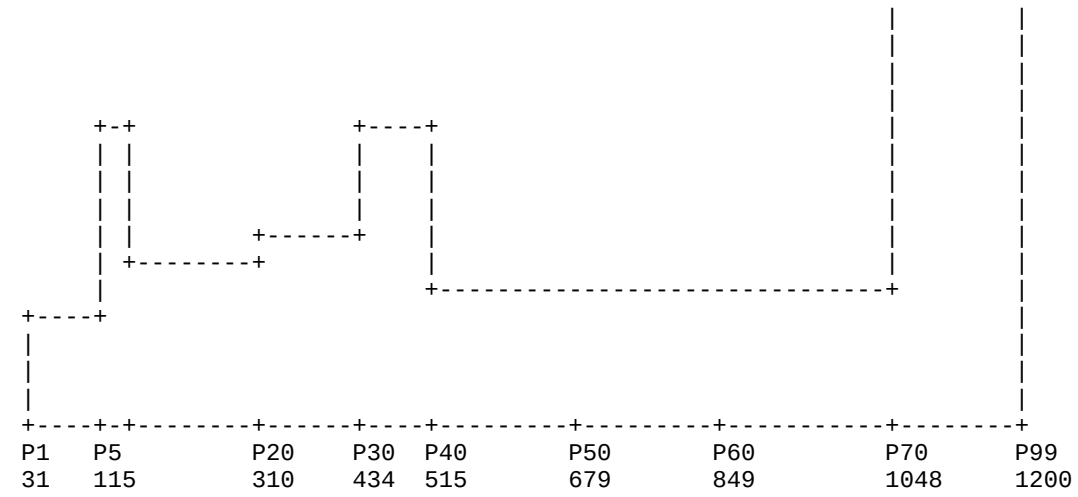
Minima	hdseqhh	Maxima	hdseqhh
30	289	1200	30
30	290	1200	30
30	291	1200	31
30	292	1200	31
30	3458	1200	32

Selected Quantiles:

Q1 = 414 P1= 31 P90=1200 P20= 310 P60= 849
Med= 679 P2= 48 P95=1200 P30= 434 P70=1048
Q3 =1114 P5= 115 P98=1200 P40= 515 P80=1147
P10= 154 P99=1200

Histogram Plot:





The distribution report indicates that the program has been implemented correctly. The maximum individual benefit is $1,200 as expected.

Guide to SPSD/M Documentation

SPSD/M INTRODUCTORY MANUAL

The SPSD/M is a complex and sophisticated tool for the analysis of the intricacies of Canada's tax/transfer system. The Introductory Manual is designed to get the user up and running in a minimum amount of time while providing an overview of the elements of the SPSD/M which must be understood to conduct valid research and analysis. The *SPSD/M Introductory Manual* consists of three documents:

Installation Guide

This guide describes machine requirements for different configurations of SPSD/M, and describes the installation on the user's PC. Lists of all files supplied with the SPSD/M can be found in this guide.

Introduction and Overview

This is the current guide, which is designed to give an overview and introduction to the SPSD/M. It describes the construction of an SPSM simulation run, and also contains several worked examples of model use. Much of the material presented here is also presented in the other guides in a more comprehensive fashion.

Addendum

This document outlines the modifications that the SPSD/M has undergone subsequent to the previous release of the SPSD/M. Users will note that the chapter headings in this Addendum correspond to guides in the manuals.

SPSD/M USER'S MANUAL

The SPSD/M has been designed and created by senior analysts who actively perform simulations using the tool. It contains powerful features which allow a broad

range of analysis options. Comprehensive descriptions of these features are contained in the five guides in this manual.

User's Guide

This guide describes how to run the SPSM in black box mode (i.e. without making any changes to the C language source code). The SPSM user-facilities are each described in a complete fashion.

User X-tab Facility

This auxiliary guide contains an expanded, more pedagogical treatment of the user-defined X-tab facility which is described in a complete, though terse fashion in the SPSD/M User's Guide.

Programmer's Guide

Intended for use by the glass box user, this guide describes how to make programming changes to the SPSM model.

Commodity Tax Model User's Guide

This guide describes the operation of the Commodity Tax (COMTAX) model. It also contains the mathematical description of the underlying Input-Output model.

Tools User's Guide

This guide describes various tools and utilities designed for use with SPSD/M, such as the spreadsheet interface and parameter file comparison utilities. The currently provided auxiliary tools take the form of other executable programs or Lotus 1-2-3 and Symphony spreadsheets.

SPSD/M REFERENCE MANUAL

There are three main ingredients to the SPSD/M which are manipulated in various ways to create various tax/transfer scenarios: the database, the algorithms and parameters. This manual provides detailed information on the components of each of these three ingredients.

Algorithm Guide

The Algorithm Guide is designed primarily to provide SPSD/M users with an understanding of the specific personal tax and cash transfer programs which are simulated together with specific information on how each program was implemented. An attempt is also made where possible and practical to guide and caution the user, where necessary, as to the interpretation of the results. The guide is intended for both black box and glass box users.

Parameter Guide

This document provides an explanation of all parameters, including control parameters, that are part of the SPSM. This includes a detailed description of how the parameters are used, their values for the various parameter files provided, and

wherever possible, the published source where the values were obtained.

Variable Guide

This document contains reference information on each SPSD/M variable. The first part of this document is organized by subject area. The second part consists of an encyclopedic reference to each SPSD/M variable, and is organized alphabetically. The reference section is for determining the detailed definition, characteristics, and use of a particular variable.

Database Creation Guide

This guide describes the general process, step by step, of constructing the micro-statistically representative SPSD.