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CAPACITY BUILDING WORKSHOP- DATA MANAGEMENT SOFTWARE

Training on data software PSPP Introduction

Dakar, March 2011

ACP Observatory on Migration
20, rue Belliardstraat (7th floor)
1040 Brussels
Tel: +32 (0)2 894 92 30
Fax: +32 (0)2 894 92 49
mrfbrusselsacp@iom.int
www.acpmigration-obs.org

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20, rue Belliard (7th floor) * 1040 Brussels – Belgium
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CAPACITY BUILDING WORKSHOP-DATA MANAGEMENT SOFTWARE

Training on Data Software: PSPP[1]

Introduction

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[1] Draft prepared by Brahim El Mouaatamid, Research Assistant at the ACP Observatory on Migration. This draft is to be reviewed according to the training progress. For any comments, please contact mrfbrusselsacp@iom.int.

Presentation of PSPP program

PSPP is a program for statistical analysis of sampled data. It is a meant to be free replacement for the proprietary program SPSS. Therefore, it is a System for statistical analysis and data management. It reads a syntax file and a data file, analyzes the data, and writes the results to a listing file or to standard output. The language accepted by PSPP is similar to those accepted by SPSS statistical products.

The current version of PSPP, 0.7.6-g26ff6f, is woefully incomplete in terms of its statistical procedure support. PSPP is a work in progress and its development is ongoing. It already supports a large subset of SPSS's syntax. PSPP can take data from SPSS files and use them to generate tabulated reports and plots of distributions and trends, descriptive statistics, and conduct complex statistical analyses.

At your option, PSPP will produce statistical reports in ASCII, PostScript, PDF, HTML, SVG, or OpenDocument formats. PSPP development is ongoing. Its statistical procedure support is currently limited, but growing.

PSPP provides a user interface that makes statistical analysis more intuitive for all levels of users. Simple menus and dialog box selections make it possible to perform complex analyses without typing many lines of command syntax.

The built-in PSPP Data Editor offers a simple and efficient spreadsheet-like utility for entering data and browsing the working data file. You can handle the output with greater flexibility by saving it into other file formats such as html and doc formats.

The main PSPP web site is : <http://www.gnu.org/software/pspp/>. However, new versions are available for download on <http://pspp.awardspace.com/> and the last version is available since March 13, 2011. The manual can be accessed on < http://sunet.dl.sourceforge.net/project/pspp4windows/pspp-master.pdf>.

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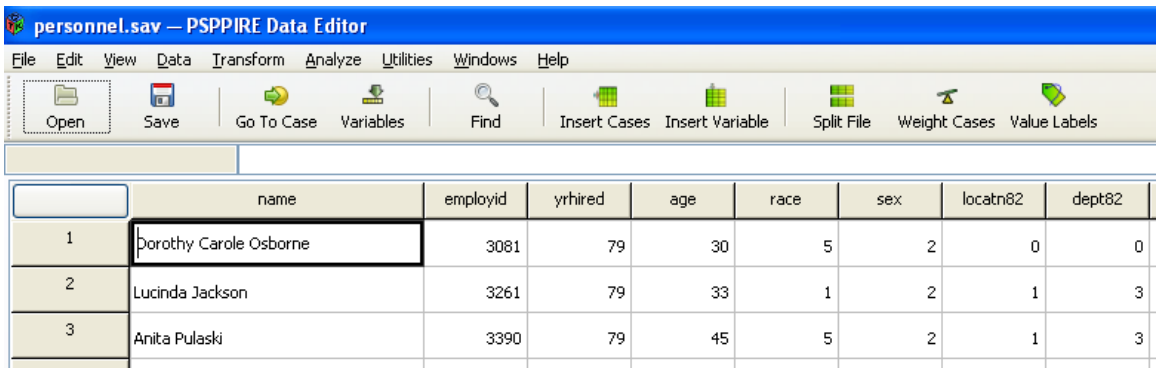
1. Windows in PSPP

There are 3 different types of windows that you will see in PSPP:

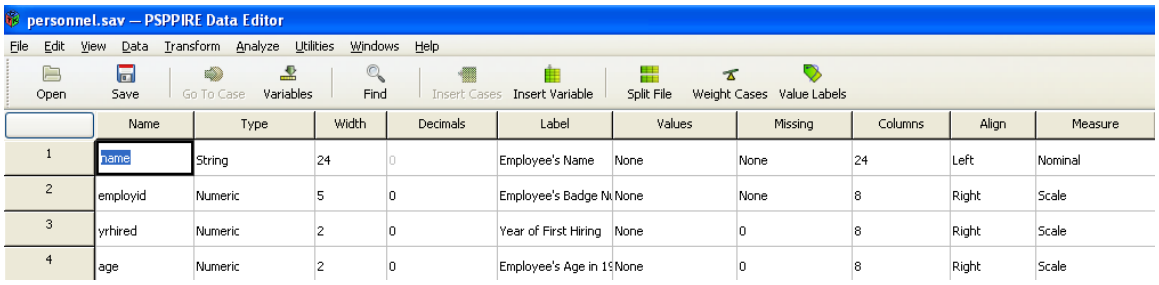
1. 1. Data Editor Window



	name	employid	yrhired	age	race	sex	locatn82	dept82
1	Dorothy Carole Osborne	3081	79	30	5	2	0	0
2	Lucinda Jackson	3261	79	33	1	2	1	3
3	Anita Pulaski	3390	79	45	5	2	1	3

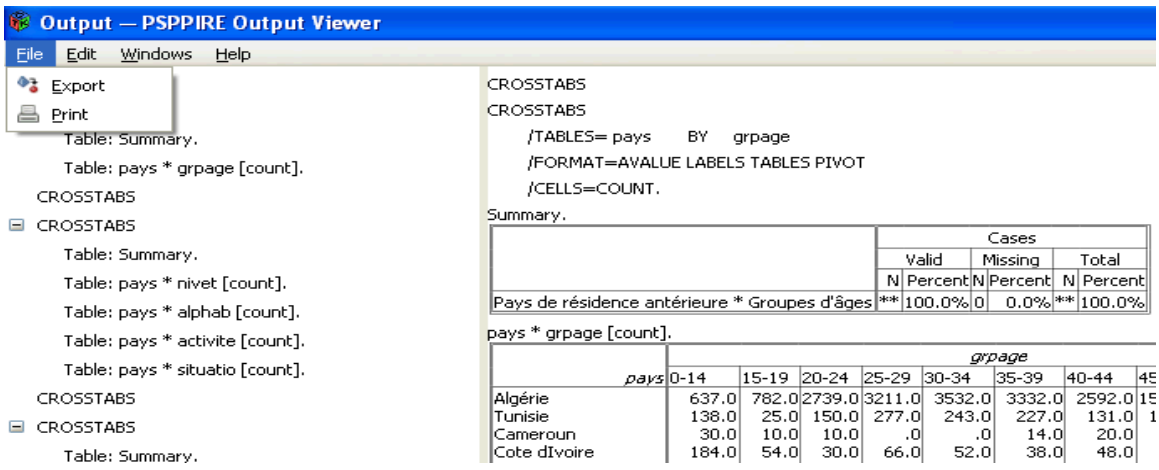
This window displays the contents of the data file. You may create new data files, or modify existing ones with the Data Editor. The Data Editor window opens automatically when you start an PSPP session.

1.1.1. Variables sub-window of the Editor window



	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1	name	String	24	0	Employee's Name	None	None	24	Left	Nominal
2	employid	Numeric	5	0	Employee's Badge Nu	None	None	8	Right	Scale
3	yrhired	Numeric	2	0	Year of First Hiring	None	0	8	Right	Scale
4	age	Numeric	2	0	Employee's Age in 19	None	0	8	Right	Scale

1.2. Viewer window



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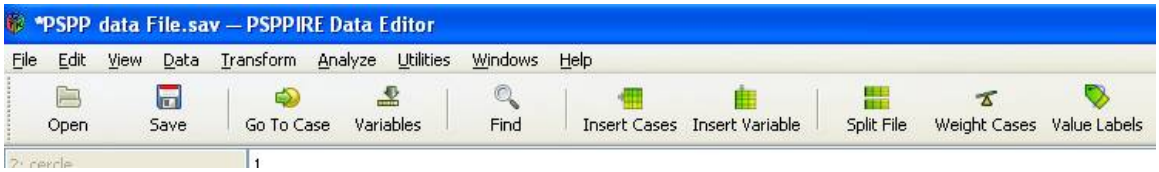
The Viewer window displays the statistical results and tables from the analysis you performed (e.g., descriptive statistics, correlations). A Viewer window opens automatically when you run a procedure that generates output. In the Viewer windows, you can edit and copy your results.

1.3. Syntax Editor Window

You can paste your dialog box choices into a Syntax Editor window, where your selections appear in the form of command syntax. You can then edit the command syntax to utilize special features of PSPP not available through dialog boxes.

You can open up a Syntax Editor window and enter PSPP commands and execute the job. You can save these commands in a file for use in subsequent PSPP sessions.

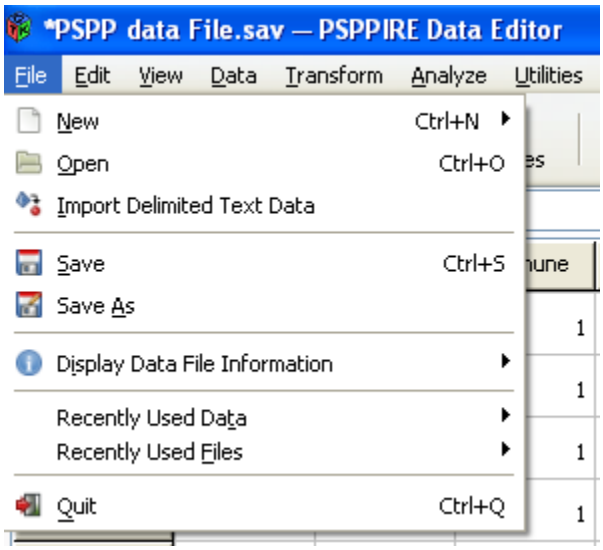
2. Menus in PSPP



Many of the tasks you may want to perform with PSPP start with menu selections. Each window in PSPP has its own menu bar with menu selections appropriate for that window type. The **Data Editor** window, for example, has the following menu with its associated toolbar:
Most menus are common for all windows and some are found in certain types of windows.

2.1. Common menus

File



Use the File menu to create a new PSPP system file, open an existing system file, read in spreadsheet or database files created by other software programs such as PSPP.

It can be used to read in an external ASCII data file from the Data Editor; create a command file, retrieve an already created PSPP command file into the Syntax Editor; open, and save output files from the Viewer.

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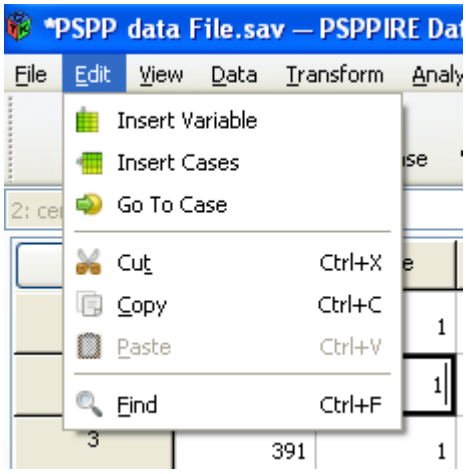
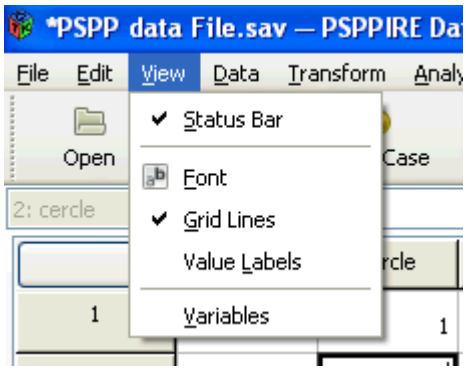
Edit



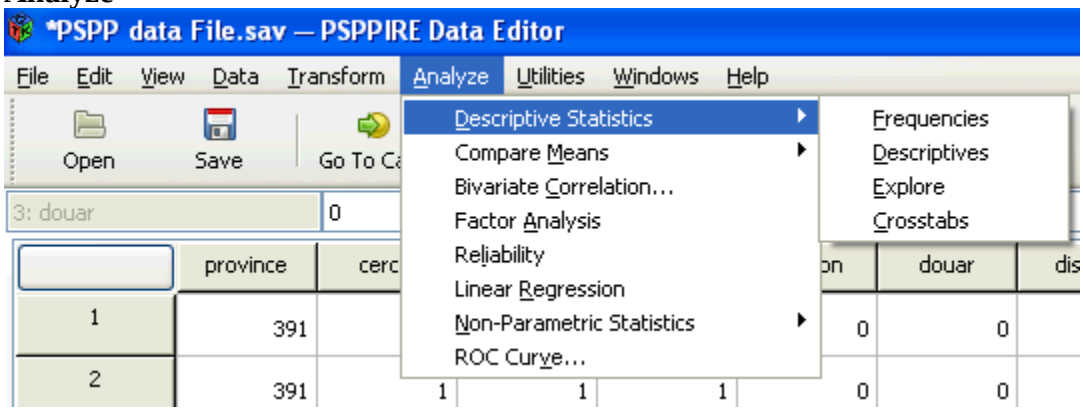
Use the Edit menu to cut, copy, and paste data values from the Data Editor; modify or copy text from the Viewer or Syntax Editor; etc. In the Data editor, this menu can be used to insert cases or variables.

View



Use the View menu to turn toolbars and the status bar on and off, and turn grid lines on and off from all window types; and control the display of value labels and data values in the Data Editor.

Analyze



This menu is selected for various statistical procedures such as tabulation, crosstabulation, correlation, linear regression, factor analysis, etc.

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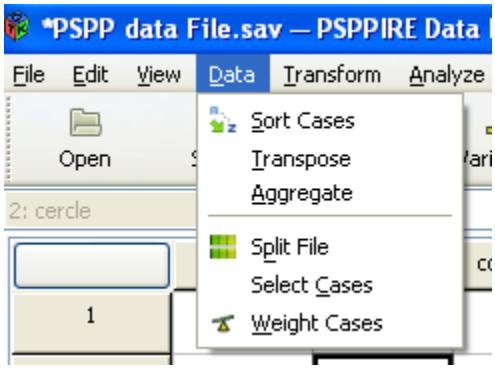
Utilities
Use the Utilities menu to display information about variables in the working data file.

Help
The Help menu is not fully operational. It should open the reference manual which contains information on how to use the many features of PSPP. Context sensitive help is not yet available through the dialog boxes although the icon is there.

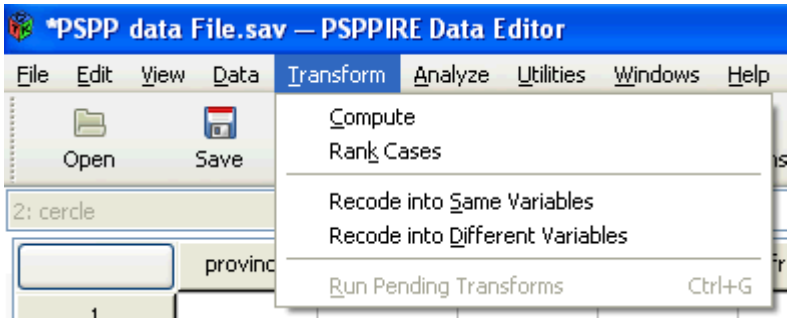
2.2. Data Editor specific menus

Data



Use the Data menu to make global changes to PSPP data files, such as transposing variables and cases or creating subsets of cases for analysis. These changes are only temporary and do not affect the permanent file unless you save the file with the changes.

Transform



Use the Transform menu to make changes to selected variables in the data file and to compute new variables based on the values of existing ones. These changes are temporary and do not affect the permanent file unless you save the file with changes.

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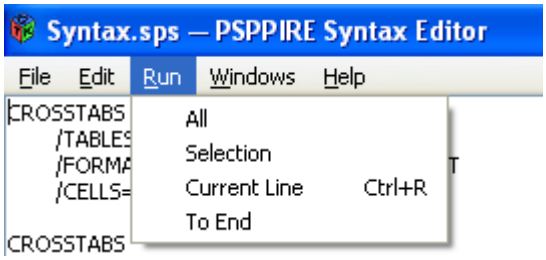
2.3. Syntax Editor specific menu

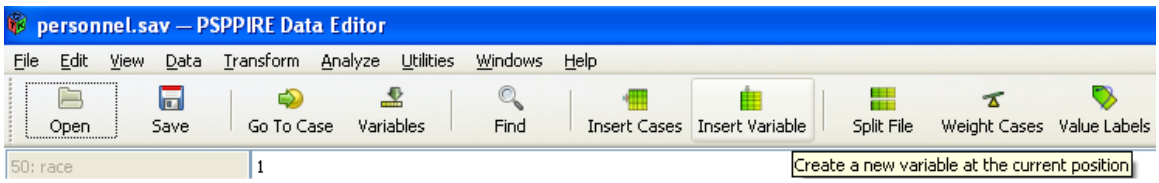
Run



Use the Run menu to run the selected commands.

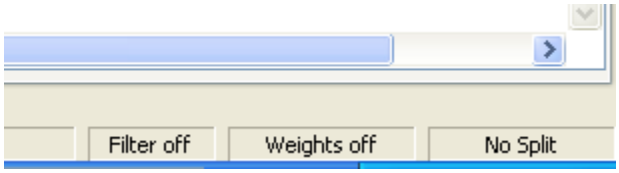
Toolbars in PSPP

The Data Editor Viewer window has a toolbar that provides quick and easy access to common tasks. Tool Tips provide a brief description of each tool when you put the mouse pointer on the tool. For example, the toolbar with **Insert Variable** shows the following tool tip (create a new variable at the current position) when the mouse pointer is put on the icon:



All these tasks are also available under diverse elements of the menu (Edit, Data, etc.).

Status Bar in PSPP for Windows



A status bar at the bottom right of the PSPP application window indicates the current status of the PSPP session. The status bar provides information such as command status, filter status, weight status, and split file status.

3. Preparing Data for Analysis

3.1. Organizing Data for Analysis

Suppose you have three remittance values collected for a group of 10 migrants (5 males, and 5 females) during a limited duration of time (18 mounts, value registered at the end of each semester for that semester). Each migrant was assigned an identification number. The information for each migrant you have is an identification number, gender of each migrant, and value for remittance one, remittance two, and remittance three (the full data set is displayed toward the end of this section for you to view). Your first task is to present the data in a form acceptable to PSPP for processing.
PSPP uses data organized in rows and columns. Cases are represented in rows and variables are represented in columns.

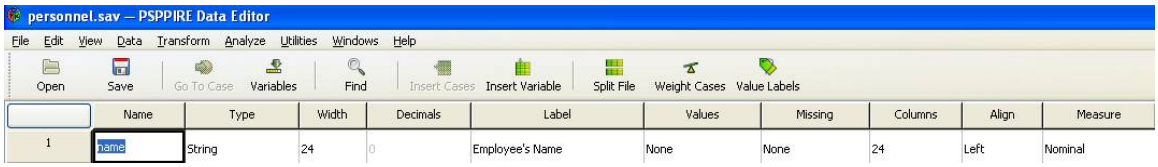
Variable
•

Name	Rem1	Rem2	rem3	
Mig1	20	23	24	• Case
Mig2	21	26	28	

A case contains information for one unit of analysis (e.g., a person, a country, a region). Variables are information collected for each case, such as name, sex, age, income, country of birth, educational level. In the above chart, there are two cases and four variables.

Attributes of Variables

In PSPP, each variable has a number of attributes, including the name, Type, Width, Decimals, Labels, Values, Decimals, Label, Values, Missing, Columns, Align, Measure.



Name: it is an identifier, up to 64 bytes long. Each variable must have a different name less than eight characters of variable names are recommended. They must begin with a letter, although the remaining characters can be any letter, any digit, a period, or the symbols (@, #, _, or $). Variable names cannot end with a period '.' because such an identifier will be misinterpreted when it is the final token on a line. The '.' will be considered mistakenly as indicating end-of-command. Variable names that end with an underscore '_'should be avoided. Some system variable names begin with '$', but user-

defined variables' names may not begin with '$'. Blanks and special characters such as &, !, ?, ', and * cannot be used in a variable name. Variable names are not case sensitive. Each variable name must be unique; duplication is not allowed.

Type: most variables are generally numeric (e.g., 12, 93.23) or character / string / alphanumeric (e.g., F, f, Ousmane). Only the first 16 digits are correct. The maximum number of decimal positions depends on the number of digits you have before the decimal point because the total valid digits for the numeric variable is 16. String variables with a defined width of eight or fewer characters are short strings; more than eight characters are long strings. Short string variables can be used in many PSPP procedures.

You may leave a blank for any missing numeric values or enter a user-define missing (e.g., 9, 99, 999) value. However, for string values a blank is considered a valid value. You may choose to enter a user-defined missing (e.g., x, xxx, na) value for missing short string variables, but long string variables cannot have user-missing values.
Following the conventions above, let us assign names for the variables in our data set: id, sex, Rem1, Rem2, and Rem3.

Once the variables are named according to PSPP conventions, it is a good practice to prepare a code book with details of the data layout. Following is a code book for the data in discussion. Note that this step is to present your data in an organized fashion. It is not mandatory for data analysis. A code book becomes especially handy when dealing with large number of variables. A short sample data, like the following, may not need a code book, but it is included for illustration.

Name	Type	Width	Label	Columns
id	8	Numeric	identification no.	2
sex	8	String	migrant gender (f, m)	1
Rem1	8	Numeric	Remittance value 1st sem.	2
Rem2	8	Numeric	Remittance value 2nd sem.	2
Rem3	8	Numeric	Remittance value 3rd sem.	2

In the above code book, **width** indicates the length of a variable measured in digits or characters. For example, the value for variable **id** takes a maximum of two fields since the highest identification number in our example is going to be 10. The value for variable **sex** takes a maximum of one field, and so on. **Columns** affect only the display of values in the Data Editor. Changing the column width does not change the defined width of a variable **type** specifies the data type (numeric, comma, dot, scientific notation, date, dollar, custom currency or string). In our example, **sex** is the only string variable coded as **f** for female, **m** for male.

4. Data Entry

The next issue is entering your data into the computer. There are several options. You may create a data file using one of your favorite text editors, word processing packages (e.g., MS-Word) or a spreadsheet (e.g., Excel) and read it directly into PSPP for Windows. Files created using word processing software or a spreadsheet should be saved in text format (.txt) before trying to read them into a PSPP session.

Finally, you may enter the data directly into the spreadsheet-like Data Editor of PSPP. In this document we are going to examine two of the above data entry methods: using a text editor/word, and using the Data Editor of PSPP.

4.1. Using an Editor/Word Processor to Enter Data

Let us first look into the steps for using a text editor or word processor for entering data. Note that if you have a data set with a limited number of variables, you may want to use the PSPP **Data Editor** to enter your data. However, this example is for illustration purposes.
Open up your editor session, or word session, and enter the variable values into appropriate columns as outlined in the code book. If you are using a word processor, make sure to save your data in text format (txt). Your completed data file will appear as follows.

01f838591
02f657268
03f909490
04f878082
05f788680
06m607464
07m889692

Save the data as a text file named, **Remit.txt**.
Notice that in the above data layout no blank space is left after each variable. We will discuss later the case of blank space left between variables as specified in the code book. It is optional whether to leave a space between variable values.

Whichever style (format) you choose, as long as you convey the format correctly to PSPP, it should not have any impact on the analysis.

4.2. Creating a Command file to read in your data

In many instances, you may have an external ASCII data file made available to you for analysis, just like the data, **remit.txt**, we discussed earlier. In such a situation, you do not have to enter your data again into the **Data Editor**. You can direct PSPP to read the file from the PSPP **Syntax Editor** window.[2]
Suppose you want to read the file, **remit.txt**, into PSPP from a **Syntax Editor** window and create a system file. Creating a command file is a faster way to define your variables, especially if you have a large number of variables. You may create a command file using your favorite editor or word processor and then read it into a **Syntax Editor** window or open a **Syntax Editor** Window and type in the command lines.

To read your already created command file into a **Syntax Editor** window Select **File • Open • Syntax...** Choose the syntax file (with .sps extension) you want to read and click **Open.** In the following example we are opening a new **Syntax Editor** window.
Select **File • New • Syntax.** When the **Syntax Editor** window appears, type:

```
GET DATA /TYPE=TXT /FILE='C:\PSPP\Remit.txt'/ARRANGEMENT=FIXED
/FIRSTCASE=1 /VARIABLES= id 0-1 F sex 2 A rem1 3-4 F rem2 5-6 F rem3 7-
8 F.
```

Alternatively, to save the new file immediately in PSPP data format, you type:

```
GET DATA /TYPE=TXT /FILE='C:\PSPP\Remit.txt'/ARRANGEMENT=FIXED
/FIRSTCASE=1 /VARIABLES= id 0-1 F sex 2 A rem1 3-4 F rem2 5-6 F rem3 7-
8 F.
EXECUTE.
SAVE /OUTFILE='C:\PSPP\remit.sav'.
```

Click and drag with your mouse to highlight the lines entered, then click **Run** and choose **selection**.

This supposes that the name and location of the file is: C:\PSPP\Remit.txt
If different, you change.

The command file will read the specified variable values from the data file, Remit.txt, on C:\PSPP, and create a system file, **remit.sav**, on C:\PSPP. Make sure you specify the pathname; appropriately indicating the location of the external data file and where the newly created file is to be written. However, you do not have to save a system file to do the analysis. This means the last line is optional for data analysis. Every time you run the above lines, PSPP does create an active file stored in the computer's memory. However,

[2] You can also use the Menu à File à Import Delimited Text Data. If this end with a bug, use the Syntax Editor and create an appropriate command file.

for large data sets, it will save processing time if you save it as a system file and access it for analysis.

In the above command lines, **VARIABLES** defines a raw data file by assigning names and formats to each variable in the file. They can be in fixed format (values for the same variable are always entered in the same location on the same record for each case) or in free format (values for consecutive variables are not in particular columns but are entered one after the other, separated by blanks or commas). In our example, we have the fixed format and used `ARRANGEMENT=FIXED`.

`FIRSTCASE=1` is the default if data starts from the first row. That is, in our example we did not have to use the `FIRSTCASE=1` keyword, but it is included for the sake of illustration. The only string variable in the data is **sex**, which is identified with a A after the variable name and column location. The others are identified with an F as numeric variables.

4.3. Reading delimited data

In the case of blank space left after each variable. The syntax will be different. For example, you may choose to enter/save in texte (.TXT) format as following:

id sex rem1 rem2 rem3
01 f 83 85 91
02 f 65 72 68
03 f 90 94 90
04 f 87 80 82
05 f 78 86 80
06 m 60 74 64
07 m 88 96 92
08 m 84 79 82
09 m 90 87 93
10 m 76 73 70

In this case, when Syntax editor window appears, you type:

```
GET DATA /TYPE=TXT /FILE='C:\PSPP\Remit2.txt' /DELIMITERS=' '
/FIRSTCASE=2
        /VARIABLES=id F2
                   sex A1
                   rem1 F2
                   rem2 F2
                   rem3 F2.
```

And if we want to save immediately the new PSPP data file, we add the commands as showed by these two following line.

```
EXECUTE.
SAVE /OUTFILE='C:\PSPP\Remit2.sav'.
```

Most databases and spreadsheet programs are able to read or save data in a delimited text format. Any character or sequence of characters may be used to separate the values, but the most common delimiters are the comma, tab, and colon. The vertical bar (also referred to as *pipe*) and space are also sometimes used. The data files with formats using delimiter-separated values can be read by PSPP. In this case, you adapt the syntax by indicating the appropriate delimitation.

You can also save the created command file into a **Syntax Editor** window Select **File • Save... and save** the syntax file (with .sps extension).

Using Text Import Wizard to Read Text Data[3]

Using Text Import Wizard is another way to direct PSPP to read an external ASCII data file. Suppose you want to read the file, **remit.txt**, into PSPP from Text Import Wizard.
Select **File • Import delimited data**, choose the data file **remit.txt** in your (C:\PSPP) drive and click **Open and follow the** Steps in the wizard to specify how the data should be read.
The data file is read into the PSPP. We can save the data file as remit.sav.

4.4. Using the PSPP Data Editor for entering data

Suppose you want to use the PSPP features for data entry. In that case, you enter data directly into the PSPP spreadsheet-like Data Editor. This is convenient if you have only a small number of variables. The first step is to enter the data into the Data Editor window by opening a PSPP session. You will define your variables, variable type (e.g., numeric, string), number of decimal places, and any other necessary attributes while you are entering the data. In this mode of data entry, you must define each variable in the Data Editor. You cannot define a group of variables (e.g., Q1 to Q10) using the Data Editor. To define a group of variables, without individually specifying them, you would use the Syntax window.

Let us start a PSPP session to enter the above data set. Start Windows and launch PSPP. This opens the PSPP Data Editor window (titled Untitled). The Data Editor window contains the menu bar, which you use to open files, choose statistical procedures, etc. When you start a PSPP session, the Data Editor window always opens first. You are ready to enter your data once the Data Editor window appears. The first step is to enter the variable names that will appear as the top row of the data file. When you start the

[3] This option is still experimenting bugs in the current version of PSPP (March 2011).

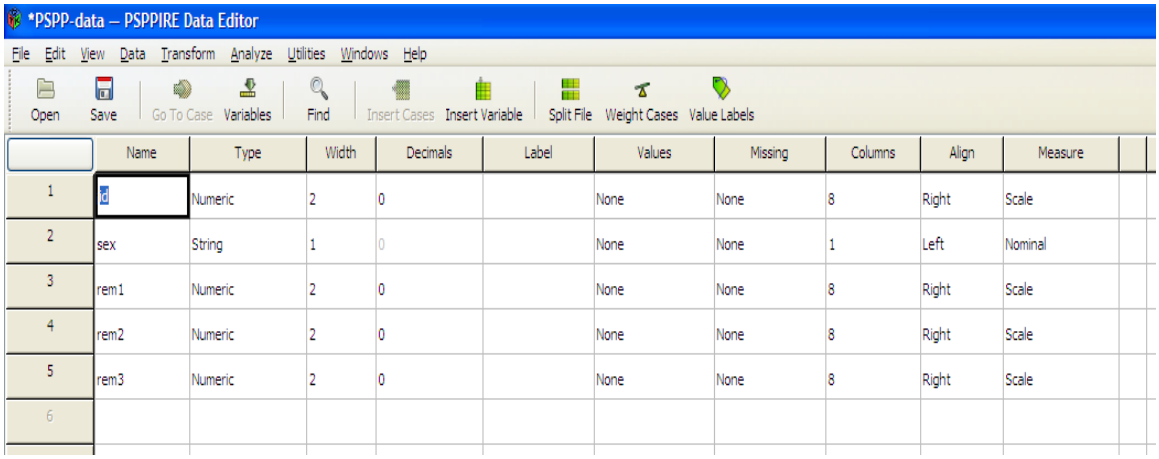
session, the top row of the Data Editor window contains a dimmed **var** as the title of every column, indicating that no data are present. In our sample data set, discussed above, there are five variables named earlier as **id**, **sex**, **remit1**, **remit2**, and **remit3**. Let us now enter these variable names into the **Data Editor**.
To define the variables, click on the **Variable View** tag at the lower left corner of the Data Editor window and:

- Type in the variable name, **id**, at the first row under the column Name.
- Press the **Tab** key to fill-in the variable's attributes with default settings.

PSPP considers all variables as numeric variables by default. Since **id** is a numeric variable you do not have to redefine the variable type for **id**. However, you may want to change the current format for decimal places. Enter 0 for Decimals.
Now let us define the second variable, **sex**.

- Type in the variable name, **sex**, at the second row under the column Name.
- Press the **Tab** key to fill-in the variable's attributes with default settings.
- To modify the variable type, click on the grey vertical rectangle icon in the Type column.
- Select **String** by clicking on the circle to the left.

Define the remaining three numeric variables, **rem1**, **rem2**, and **rem3**, the same way the variable **id** was defined. Once you have finished, the Variable View screen should look like:



	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1	id	Numeric	2	0		None	None	8	Right	Scale
2	sex	String	1	0		None	None	1	Left	Nominal
3	rem1	Numeric	2	0		None	None	8	Right	Scale
4	rem2	Numeric	2	0		None	None	8	Right	Scale
5	rem3	Numeric	2	0		None	None	8	Right	Scale
6										

Click on the **Data View** tag. Now enter the data pressing [Tab] or the right arrow key after each entry. After entering the last variable value for case number one use the arrow key to move the cursor to the beginning of the next line. Continue the process until all the data are entered.

The ACP Observatory on Migration
20, rue Belliard (7th floor) * 1040 Brussels – Belgium
Tel (general): +32 (0)2 894 92 30 * Fax: +32 (0)2 894 92 49
Email (general): mrfbrusselsacp@iom.int
Website: www.acpmigration-obs.org
An ACP Secretariat Initiative, Empowered by IOM, Funded by the European Union with the Financial Support of Switzerland
Schweizerische Eidgenossenschaft
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Confederazione Svizzera
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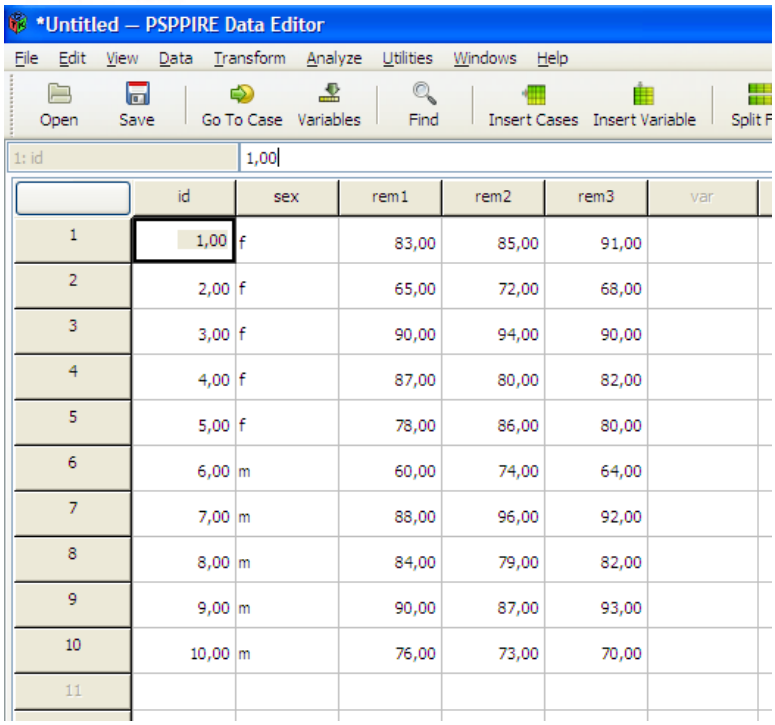
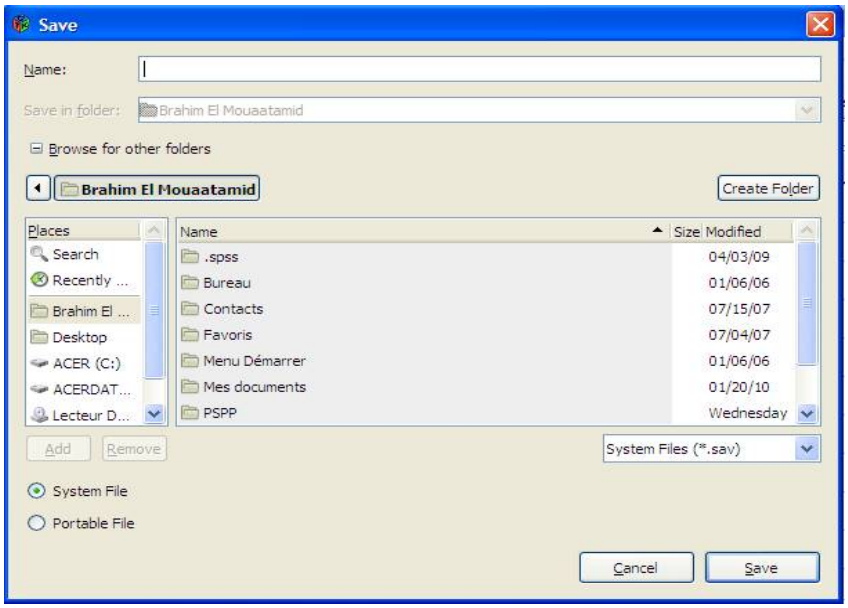


	id	sex	rem1	rem2	rem3	var
1	1,00	f	83,00	85,00	91,00	
2	2,00	f	65,00	72,00	68,00	
3	3,00	f	90,00	94,00	90,00	
4	4,00	f	87,00	80,00	82,00	
5	5,00	f	78,00	86,00	80,00	
6	6,00	m	60,00	74,00	64,00	
7	7,00	m	88,00	96,00	92,00	
8	8,00	m	84,00	79,00	82,00	
9	9,00	m	90,00	87,00	93,00	
10	10,00	m	76,00	73,00	70,00	
11						

4.5. Saving PSPP Data

After you have entered/read the data into the **Data Editor**, save it onto C:\PSPP or the flash drive or any other location.

- Select **Save...** or **Save As...** from the **File** menu. A dialog box appears:



In the box below **File Name** type C:\PSPP**remit.sav**.
Click **OK**
The data will be saved as a PSPP format file which is readable by PSPP. Note that the data file, **remit.txt**, you saved earlier and the file, **remit.sav**, you saved now are in different formats.

4.7. Read ASCII data and save as a PSPP data file

The purpose of this example is to illustrate:

1. Data input from the data file Personnel.dat via the DATA LIST command.
2. Saving data & a data dictionary (includes all labels and missing value codes) as an SPSS data file via the SAVE OUTFILE command. Note that you can also create a PSPP data file by selecting Save from the File menu in the SPSS Data Editor.

Personnel.dat - ASCII data file à Personnel.sav - PSPP data file created
Note the location of both data files is the PSPP folder in the C: drive.
To run these syntax commands select Run à All from the Run menu in the PSPP Syntax Editor.

```
data list file='C:\PSPP\Personnel.dat' records=2
   /1 name 1-24(A) employid 26-30
   /2 yrhired 3-4 age 6-7 race 9 sex 11 locatn82 13 dept82 15
     jobcat 17 promo82 19 salary82 21-25 raise82 27-31
     eeo82 33-33.
variable labels
   name     "Employee's Name"
   employid "Employee's Badge Number"
   yrhired  "Year of First Hiring"
   age      "Employee's Age in 1980"
   race     "Employee's Race"
   sex      "Employee's Sex"
   locatn82 "City Where Employed"
   dept82   "Department Code in 1982"
   jobcat   "Job Category"
   promo82  "Was Emp Promoted in 1982?"
   salary82 "Yearly Salary in 1982"
   raise82  "Increase in Salary over 1981".
value labels
   race 1 'Black' 2 'A.Indian' 3 'Oriental' 4 'Latino'
        5 'White'
  /sex 1 'Male' 2 'Female'
  /locatn82 0 'Not Employed' 1 'Chicago' 5 'St. Louis'
  /dept82 0 'Not Employed' 1 'Administrative' 2 'Project Directors'
          3 'Chicago Operations' 4 'St. Louis Operations'
  /jobcat 1 'Officials & Managers' 2 'Professionals'
          3 'Technicians' 4 'Office and Clerical' 5 'Craftsmen'
          8 'Service Workers'
  /promo82 0 'No' 1 'Yes' 9 'Not Employed'.
missing values
   yrhired to dept82 salary82 (0)/ promo82 (9)/raise82 (-999).

execute.
save outfile='C:\PSPP\Personnel.sav'   /compressed.
```

5. Descriptive Data Analysis

Suppose that you have the data set, **remit.sav**, still displayed on the screen. If not, select **PSPP Data Editor à Open à** C:\PSPP**remit3.sav à Open**
Here, for the data processing, let us use an extended file containing data for 40 cases.

The next step is to run some basic statistical analysis with the data you entered. The commands you use to perform statistical analysis are developed by simply pointing and clicking the mouse to appropriate menu options. This frees you from typing in your command lines.

However, you may paste the command selections you made to a **Syntax Editor** window. The command lines you paste to the **Syntax Editor** window may be edited and used for subsequent analysis, or saved for later use. Use the **Paste** pushbutton to paste your dialog box selections into a **Syntax Editor** window. If you don't have an open **Syntax Editor** window, one opens automatically the first time you paste from a dialog box. Click the **Paste** button only if you want to view the command lines you generated. Once you click the **Paste** pushbutton the dialog selections are pasted to the **Syntax Editor** window, and this window becomes active. To execute the pasted command lines, highlight them and click **run à Selection** or **Run à All if** this is the case. You can always get back to the **Data Editor** window by selecting **remit3.sav-PSPP Data Editor** from the **Window** menu.