
Tutorial: Learning to Write in Amos Basic



Purpose

Amos 4.0 has a programming interface called **Amos Basic**. With **Amos Basic**, you can specify models as sets of equations, rather than via the “boxes and arrows” notation introduced earlier. **Amos Basic** can be unbeatable as a workhorse for larger models and batch-oriented model estimation.

It also allows you to manipulate and save the estimation results. Whenever you are more interested in the parameter values than in the paths themselves, equation mode can be the more efficient interface.

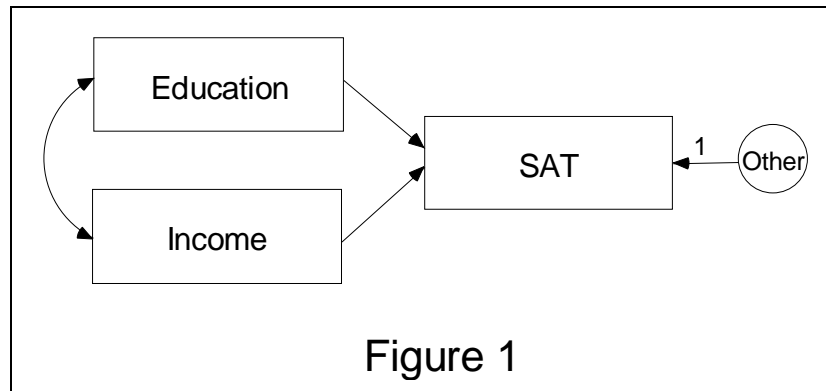
This tutorial will get you started learning to write in **Amos Basic** under Microsoft Windows. Once you have worked through this section, you can continue to incrementally learn about **Amos Basic** and its statistical applications by working through the Examples section of this User’s Guide. Extensive, advanced reference material for **Amos Basic** is included in the *Amos 4.0 Programming Reference Guide*. This volume is available as a downloadable Portable Document Format (PDF) file from the **Amos 4.0** CD-ROM or as a Help file under either the **Amos Graphics** or **Amos Basic** Help menu.

Prerequisites

This tutorial assumes that **Amos 4.0** has been installed on your computer. If you have not yet installed Amos, it might be a good idea to install it now. Also, this tutorial assumes that you already have some basic experience with both text and graphics operations under the Microsoft Windows operating system. You should know how to select an item from a menu, use the mouse, and edit plain text files with a system editor such as Microsoft Notepad®.

Data and model

Hamilton's (1990) data, featured in the **Amos Graphics** tutorial are used once again in this example. We will consider the path model in the **Amos Graphics** example and reproduced here in **Figure 1**:



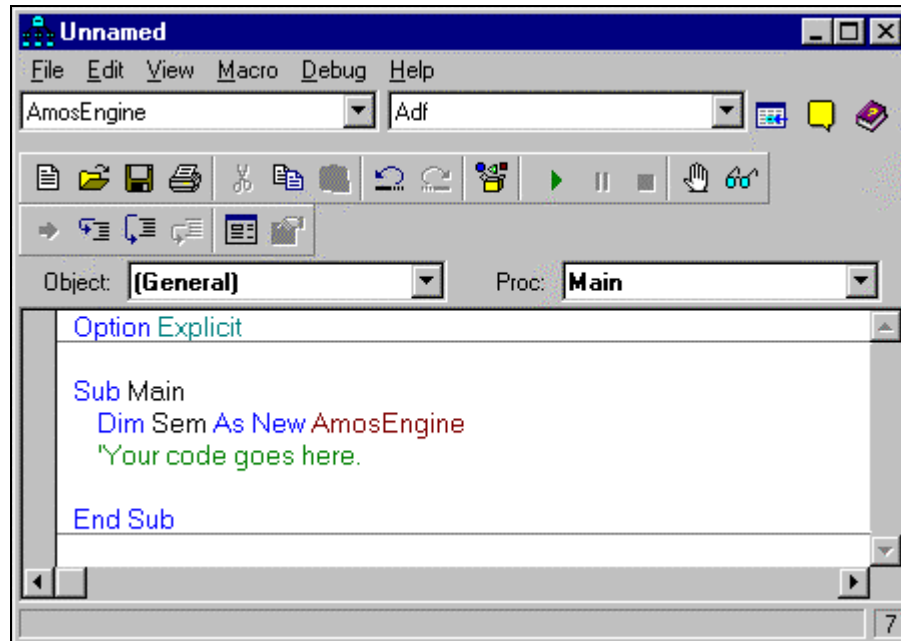
The path model can be expressed as a traditional regression equation of the SAT deviation scores:

$$\text{SAT} = b_1 \cdot \text{Education} + b_2 \cdot \text{Income} + \text{Other}$$

You will need to provide **Amos Basic** with information about both the data and this predication model.

Specifying the model

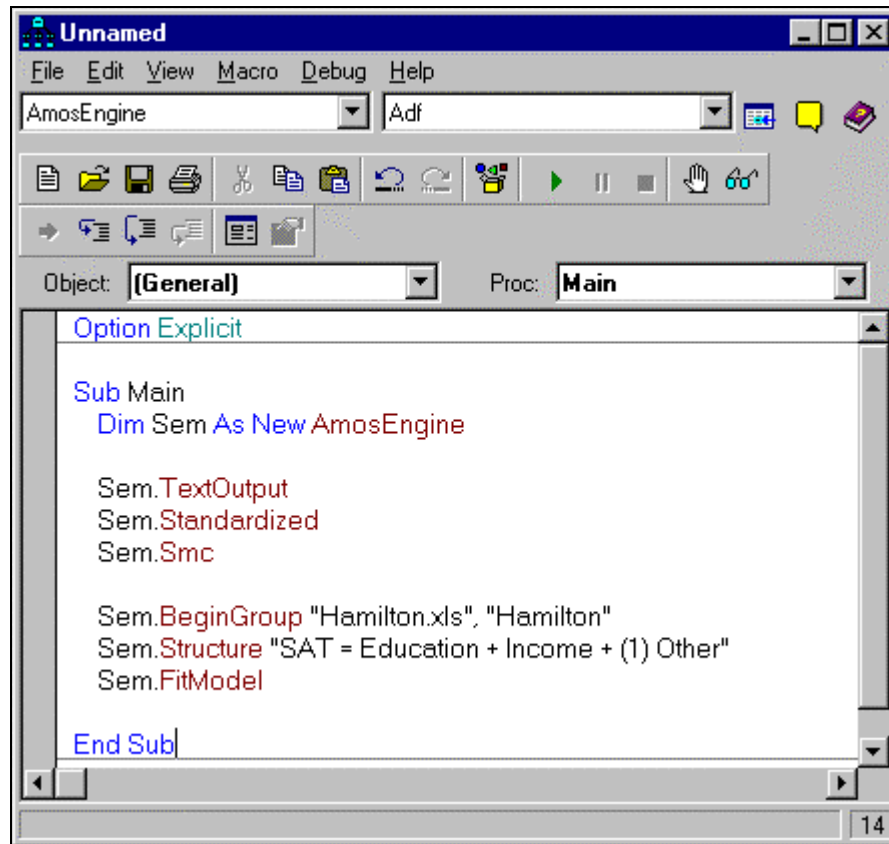
Begin by clicking on **Amos Basic** in the **Amos 4.0** program group. After the **Program Editor** has opened, click on **File** → **New Engine Program**:



Then, begin to enter code after the cursor. Note that the line 'Your code goes here.' starts with a single quote ('). When **Amos Basic** encounters a single quote, it treats the quote itself and all text to its right as a comment. Comments appear in green on a color display. In place of the comment, immediately following the line `Dim Sem As New AmosEngine`, type in the code for this problem.

Of course, if you do not wish to write out the code, **Amos Basic** contains the code pre-written in the file `Getstart.AmosBasic`. To get to it, click on **File** → **Open**. The default path of this file is `C:\Program Files\Amos 4\Tutorial\Getstart.AmosBasic`.

Either way, when you are done, the **Amos Basic** Program Editor should look like this:



This **Amos Basic** program may not look like much of a model yet, but each line informs the program which data to read, what parameters to estimate and in what order.

The following table is a line by line explanation of what functions these **Amos Basic** commands perform.

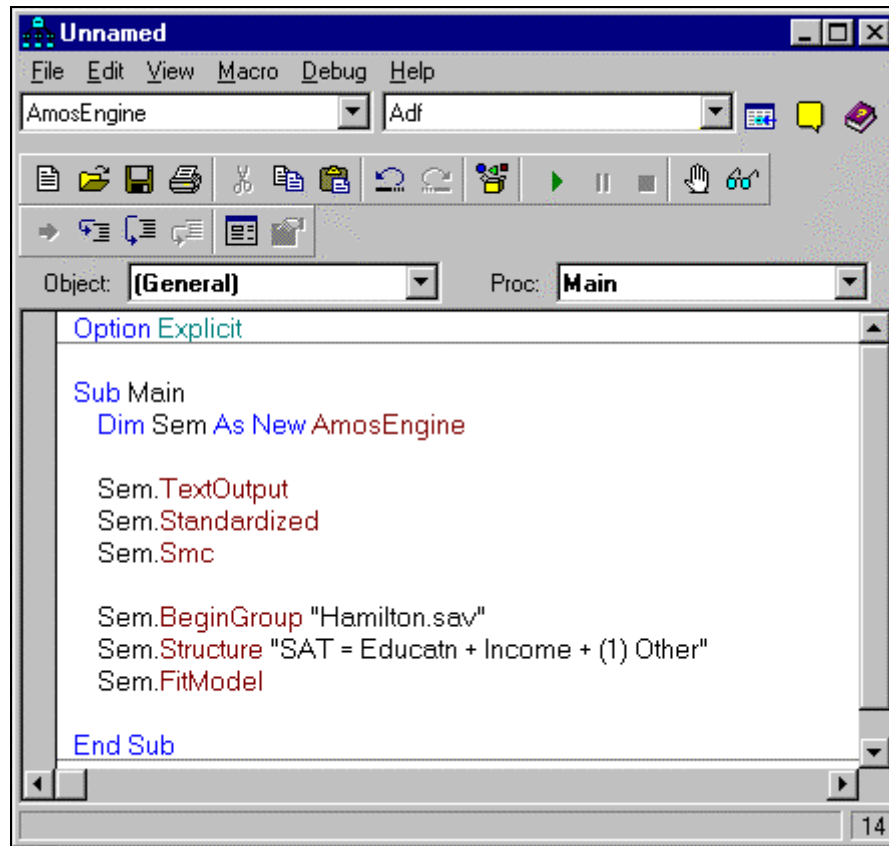
Amos Basic Command	Explanation
Sub main()	Starts the Amos Basic program.
Dim Sem As New AmosEngine	Declares Sem as an object of type AmosEngine .
Sem.TextOutput	Writes the results of the analysis to a text file to be displayed by Amos's View Text program.
Sem.Standardized	Calculates standardized regression weights and correlations among predictor variables.
Sem.Smc	Calculates the squared multiple correlation of the dependent variable SAT .
Sem.BeginGroup "Hamilton.xls", "Hamilton"	Begins the model specification for a single group (or population). Additionally, BeginGroup specifies that the input data will be from the worksheet (data table) Hamilton contained in the Excel workbook Hamilton.xls . Amos determines from the name extension .xls that the data are in the Excel format. Other formats have different extensions. This worksheet/workbook nesting of data files is a new development in spreadsheet and database organization. For many other formats (such as SPSS), you will only need to specify the actual filename.
Sem.Structure "SAT = Education + Income + (1) Other"	Used to specify a model.
Sem.FitModel	Calculates parameter estimates and model fit.
End Sub	Terminates the Amos Basic program.

Note that the **Sem.Structure** line comes after the **Sem.BeginGroup** statement. The structure declaration must come *after* **BeginGroup**. Otherwise, Amos may not recognize the variable names as observed variables.

Reading data from an SPSS system file

There is one difference to naming variables when working with SPSS data files. SPSS system files support variable names of up to eight characters. Thus, if the data file Hamilton was in the SPSS format, the variable name Education would have to be shortened to Educatn.

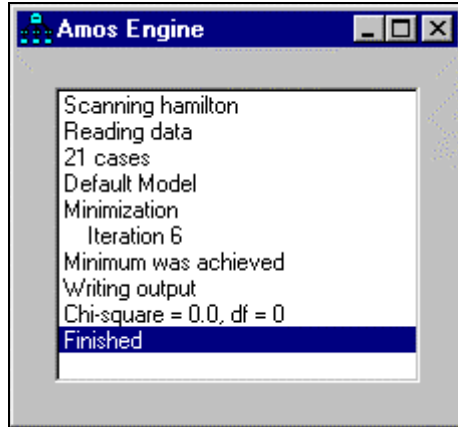
Here is what the **Amos Basic** Program Editor should look like using the SPSS **Hamilton.sav** file:



Once again, if you do not wish to write out the code, **Amos Basic** contains the code pre-written in the file **Startsps.AmosBasic**. To get to it, click on **File** → **Open**. By default, the file reference is **C:\Program Files\Amos 4\Tutorial\Startsps.AmosBasic**.



Now, click on the **Start/Resume** arrow in order to have Amos interpret the command file and data. A small window will appear and keep you informed about the progress of the computations:



When **Amos Basic** has finished the computations, the output will immediately appear. In this example, we specified text output, so (a portion of) the output will look like this:

```
Maximum Likelihood Estimates
-----

Regression Weights:
-----
          SAT <----- Education   136.022   30.555   4.452
          SAT <----- Income     2.156    3.125   0.690

Covariances:
-----
          Education <-----> Income    0.127    0.065   1.952

Variances:
-----
          Education    0.027    0.008   3.162
          Income      2.562    0.810   3.162
          Other      382.736  121.032  3.162
```

If you have made any mistakes in entering the model or the data, an error message will be located at the end of this file. These maximum likelihood estimates are identical to the standard least-square solution for regression coefficients. Amos standard errors (S.E.) are asymptotically correct. The Critical Ratio (C.R.) is defined as:

$$\text{C.R.} = \text{Estimate}/\text{S.E.}$$

Optional output

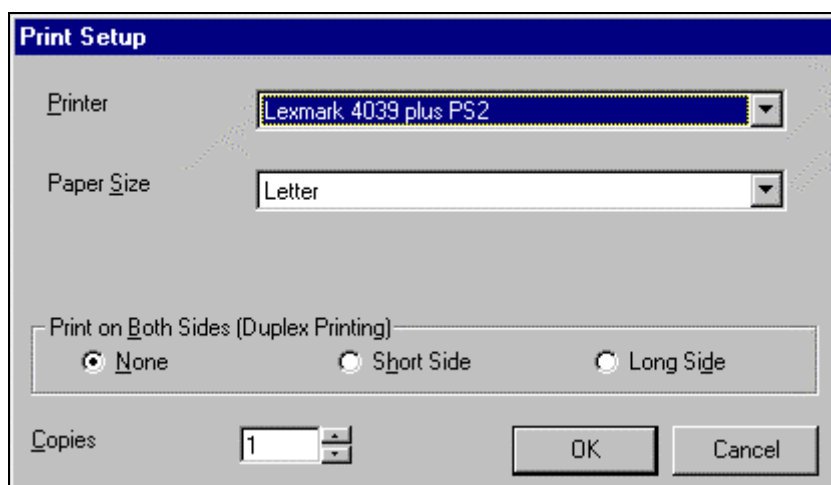
So far, we have only been discussing the Amos default output that would be obtained without any special requests. You can request additional calculations in **Amos Basic** by adding more **Amos Engine** methods. For instance, the `Sem.Structure` command in the sample code calculates standardized regression weights, and the `Sem.Smc` command calculates the squared multiple correlation of the dependent variable SAT. You will find a complete list of Engine methods in the optional *Amos 4.0 Programming Reference Guide*.

Print functions



To print the command structure (input), simply click on the **Print** icon on the toolbar, or select **File** → **Print** from the menu.

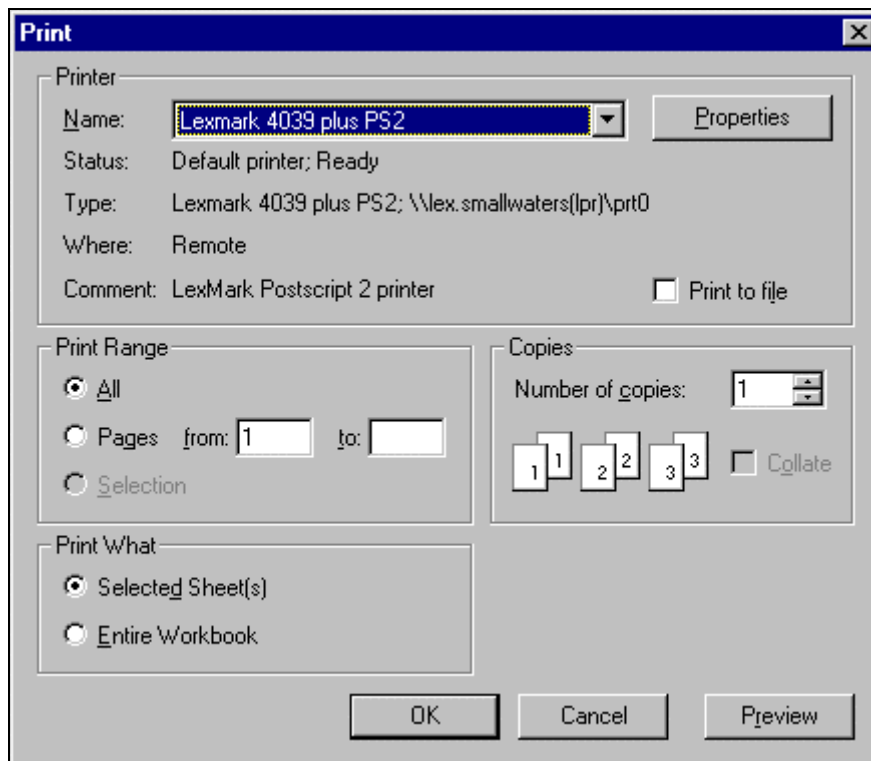
To print text output (from the command line `Sem.TextOutput`), select **File** → **Print...** from the menu. The **Print Setup** box will appear:



Make any changes to the settings you wish and click on **OK**.



To print table output (from the command line `Sem.TableOutput`), click on the **Print** icon on the toolbar. The **Print** dialog box will appear:



Make any changes to the settings you wish and click on **OK**.

Copy functions

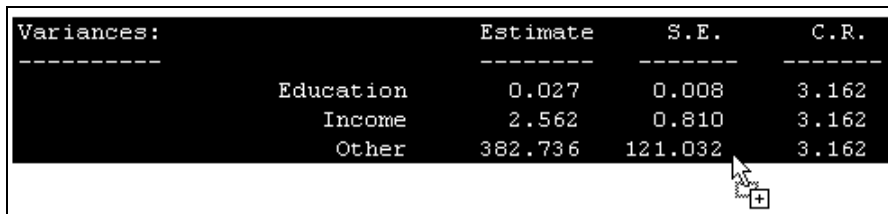
Amos Basic lets you easily import your command structure (input), text output, or table output into many word processing programs, such as Microsoft Word or WordPerfect. To copy any text, click once and then drag your mouse over the desired area (so the text is highlighted). After highlighting the data, hold down the **Control** key and the “c” key simultaneously. This will copy the highlighted text to the clipboard. Then use the **Paste** function (or press **Control** and the “v” key simultaneously) to import the text into your word processing or spreadsheet program.

If you are copying the command structure, you also have the option of highlighting the text structure (as described earlier) and then selecting **File** → **Copy** from the menu. Then, as described earlier, use the **Paste** function (or press **Control** and the “v” key simultaneously) to import the text into your word processing or spreadsheet program.

Similarly, to copy table output, highlight the portion of the table you wish to copy and select **File** → **Copy** from the menu. Then, use the **Paste** function (or press **Control** and the “v” key simultaneously) to import the text into your word processing or spreadsheet program. The copy function will not copy the table format (grid lines), so if you wish keep your original table format, you will need to paste the table output into an empty table.

There is one other trick to quickly move text output:

1. Open up your word processing program to the desired file and place within the file you wish to copy the text to.
2. Minimize the entire program (typically using the **underscore** icon in the upper right corner of the program’s screen. Your Windows operating system will display an icon representing your word processing program (typically) at the bottom of your screen.
3. In **Amos Basic**, highlight the text you wish to cut and move (as described earlier) and release the mouse button, leaving the text highlighted.
4. Click and hold down the mouse button on an area of the highlighted text. Your mouse pointer will now have a small rectangle and square with a “+” underneath it, indicating that it is moving the highlighted text:



Variances:	Estimate	S.E.	C.R.
Education	0.027	0.008	3.162
Income	2.562	0.810	3.162
Other	382.736	121.032	3.162

5. Still holding down the mouse button, move the mouse pointer to the icon representing your minimized word processing program (at this point you will only see the rectangle underneath the mouse pointer):



Your word processing program and document will automatically maximize on your desktop screen.

6. Still holding down the mouse button, move the mouse pointer to the place in your word processing document where you wish to paste in the text.
7. Release the mouse button and the selected text will be moved directly into your document.