Title

Builder — SEM Builder

Description   Remarks and examples   Reference

Description

The SEM Builder lets you create path diagrams for SEMs, fit those models, and show results on the path diagram. Here we discuss standard linear SEMs; see [SEM] **Builder, generalized** for information on using the Builder to create models with generalized responses and multilevel structure.

Remarks and examples

Launch the SEM Builder by selecting the menu item **Statistics > SEM (structural equation modeling) > Model building and estimation**. You can also type `sembuilder` in the Command window.

Select the Add Observed Variable tool, ▢, and click within the diagram to add an observed variable. Type a name in the *Name* control of the Contextual Toolbar to name the variable. If the variable is not placed exactly where you want it, simply select the Select tool and drag the variable to your preferred location.

After adding the variable, use the *Variable* control in the Contextual Toolbar to select a variable from your dataset or type a variable name into the edit field.

Add latent variables to the model by using the ○ tool.

Clicking within the diagram with either the □ or ○ tool places a variable of the default size and shape. If you instead wish to create a variable of custom size and shape, click and hold the mouse button and drag until the variable is your preferred size. Select the **Properties** button in the Contextual Toolbar or double-click on a variable to launch a dialog box where you can change even more properties of the variable. You can customize the size, shape, label font, and other appearance characteristics of the variable from the **Appearance** tab of the dialog, but you will rarely do that.

More often, you will want to change the appearance of all variables or a class of variables from the **Settings** menu. From the **Settings** menu, you can change any aspect of the appearance of variables. The **Settings > Variables** menu lets you change the appearance of **All** variables, **Latent** variables, **Observed** variables, **Latent Exogenous** variables, **Latent Endogenous** variables, **Observed Exogenous** variables, **Observed Endogenous** variables, **Error** variables, **Latent Error** variables, and **Observed Error** variables.

Draw paths between variables with the → tool. Simply click in the source variable's box or oval and drag to the target variable's box or oval. The new path can connect variables either along the line between their center points or at the edge nearest where you click and release. This connection behavior is set in the **Settings > Automation...** dialog.

Whenever a path is connected to an exogenous variable, that variable becomes endogenous and an error variable is created. If you do not like the direction of the error variable relative to the new endogenous variable, first use the ↖ tool to select the endogenous variable and then use the ↺ ↻ buttons in the Contextual Toolbar to rotate the error variable.

Draw covariances between variables with the ⌢ tool. If you drag to the right, the curve of the covariance will bend up. If you drag to the left, the curve will bend down. If you drag down, the curve will bend right, and if you drag up, it will bend left. That does not matter greatly; if the curve bends the opposite of what you want, simply click the **Mirror** button in the Contextual Toolbar.

As with variables, you can change more properties of a path or covariance (connection) by double-clicking on it or by selecting Properties from the Contextual Toolbar. You can also change the appearance of all connections from the **Settings > Connections** menu. From **Settings > Connections**, you can change the appearance of **All** connections, all **Paths**, all **Covariances**, or all **Error Paths**.

Manage variables and connections on the diagram with the Select tool, ↖. As you select an object, its Contextual Toolbar will appear. You can change the name and other properties of selected variables or the properties of selected connections. You can also drag-select or hold the *Shift* key and click to select multiple objects. Changing a property from the Contextual Toolbar or **Properties** dialog will affect all the selected objects. You can also drag selected variables as a group to other locations on the diagram.

You can place a measurement model (or measurement component of a larger model) on the diagram with the 🏆 tool. Clicking on the diagram with this tool launches a dialog box where you can name the latent variable, select or type the names of the measurement variables, and specify the direction of the measurements relative to the latent variable. You can even set the spacing between the measurement variables and the distance from the latent variable to the measurements. The 🏆 tool creates measurement components quickly and with even spacing. Similarly, neatly organized sets of observed variables can be placed with the ▫▫▫ tool; sets of latent variables, with the ∘∘∘ tool; and regression components, with the 🏳 tool.

Place annotations and other text by using the T tool.

We have ignored the locks, 🔒, in the Contextual Toolbars. These locks apply constraints to the parameters of the SEM. You can constrain variances, 🔒σ^2; means, 🔒μ; intercepts, 🔒α; and path coefficients and covariances, 🔒β. For example, select an exogenous variable or an error variable and type a number in 🔒σ^2 to constrain that variance to a fixed value. Or, select three path variables and type a name (a placeholder) in 🔒β to constrain all the path coefficients to be equal. You can type numbers, names, or linear expressions in the 🔒 controls. The linear expressions can involve only numbers and names that are used in other 🔒 controls.

Do not be afraid to try things. If you do not know what a tool, control, or dialog item does, try it. If you do not like the result, click on the **Undo** button, 🔙, in the Standard Toolbar.

Click on 📄 in the Standard Toolbar to fit the model. A dialog is launched that allows you to set all the estimation options that are not defined by the path diagram. After estimation, some of the estimation results are displayed on the path diagram. Use the **Results** tab of the **Settings > Variables** and **Settings > Connections** dialogs to change what results are shown and how they appear (font sizes, locations, etc.). Also, as you click on connections or variables, the Details pane displays all the estimation results for the selected object.

If you wish to create another model derived from the current model, click 📄 in the Standard Toolbar.

Video example

SEM Builder in Stata

Visit the Stata YouTube channel for more videos.

Reference

Huber, C. 2012. Using Stata's SEM features to model the Beck Depression Inventory. The Stata Blog: Not Elsewhere Classified. http://blog.stata.com/2012/10/17/using-statas-sem-features-to-model-the-beck-depression-inventory/.