Data based graphing: Scatter plots

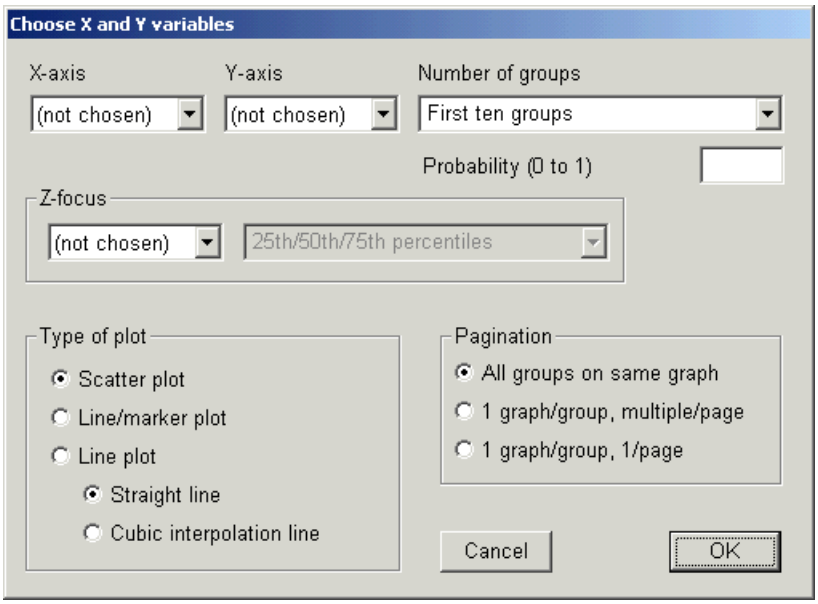
Data-based scatter plots may be used to explore bivariate relationships between level-1 variables for individual or a group of level-2 units, with and without controlling level-2 variables. We will continue to use the HS&B data set and we are going examine the relationships between MATHACH and SES for a group or individual schools, with and without controlling for the sector of the school.

To prepare a scatter plot

1. From the HLM window, open the **File** menu.

2. Choose **Create a new model using an existing MDM file** to open an **Open MDM File** dialog box. Open **hsb.mdm**.

3. Open the **File** menu, choose **Graph Data …. line plots, scatter plots** to open a **Choose X and Y variables** dialog box.



4. Select SES from the **X-axis** drop-down list box.

5. Select MATHACH from the **Y-axis** drop-down list box.

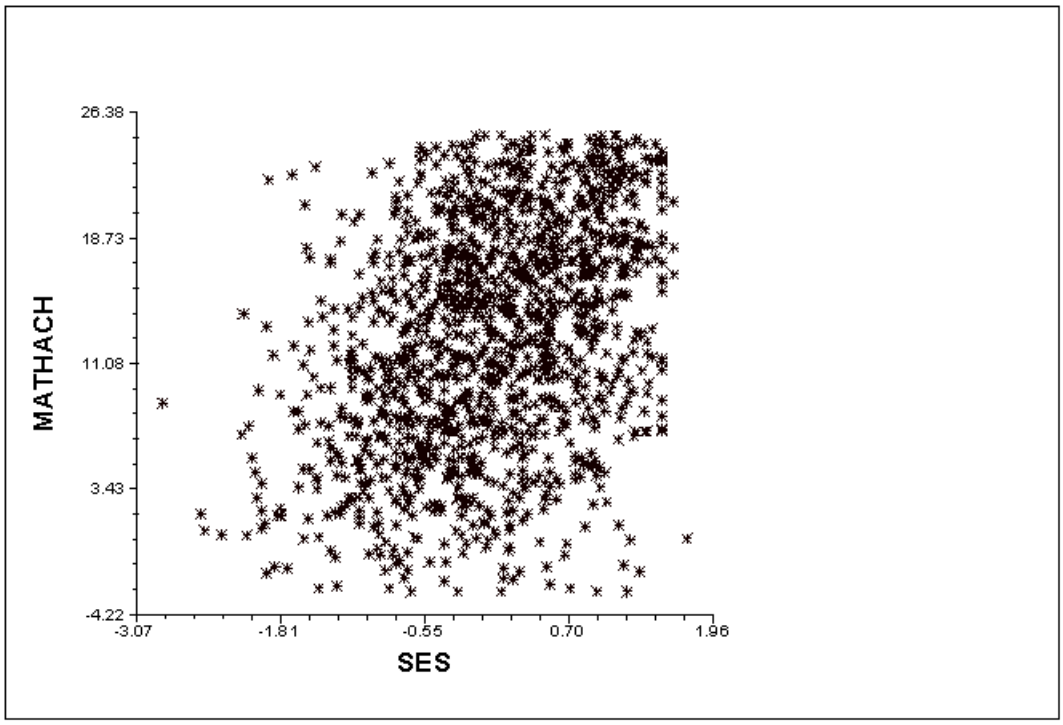
6. Select number of groups. In this example, select **Random sample of spec'd prob** and enter .2 into the text box to select 20 percent of the schools.

7. Select type of plot. Users can select one of the two major types of plots: (a) scatter plot; and (b) line plot with and without markers or asterisks showing where the data points are. Click the selection button for **Scatter plot** (default) for

this example.

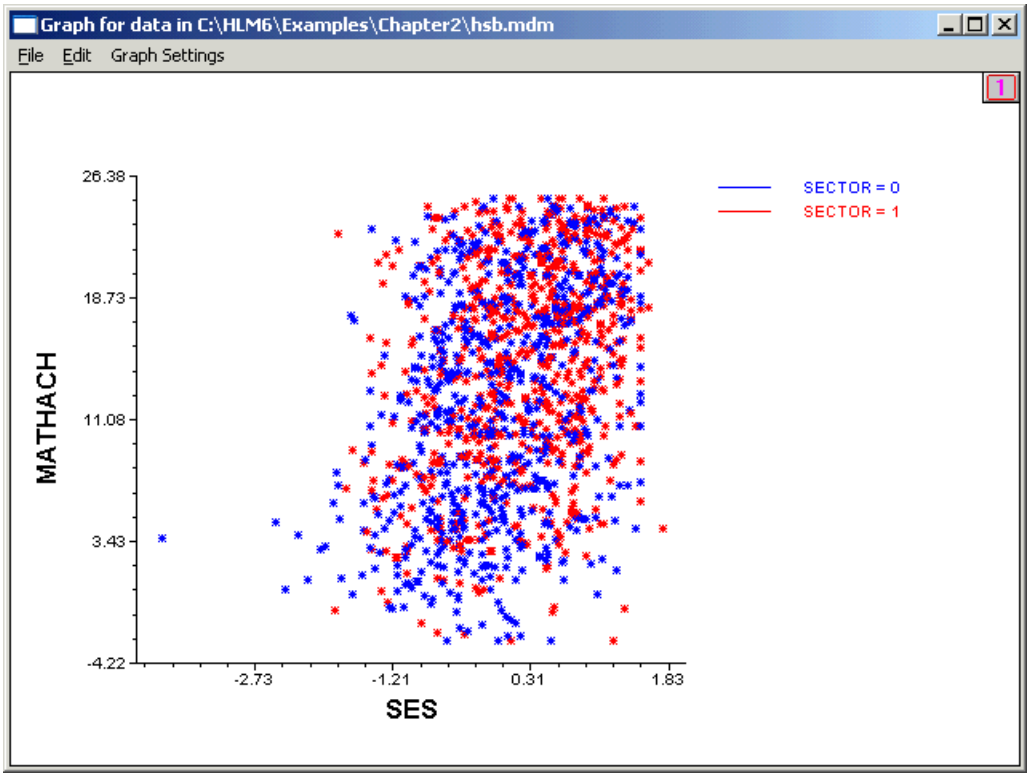
8. Select type of pagination. There are three options: (a) **all groups on the same graph** (default); (b) one graph per groups and to display a maximum of eight graphs on one page, and (c) 1 graph per group and to be displayed on multiple pages. In this example, we will display the bivariate relationship between SES and MATHACH for all the selected schools on a single graph. We choose the option **All groups on same graph** accordingly.

9. Click **OK** to make the scatter plot. This gives us the following graph, indicating a moderate positive association between SES and MATHACH, and suggesting that both variables have “ceilings” (upper limits).



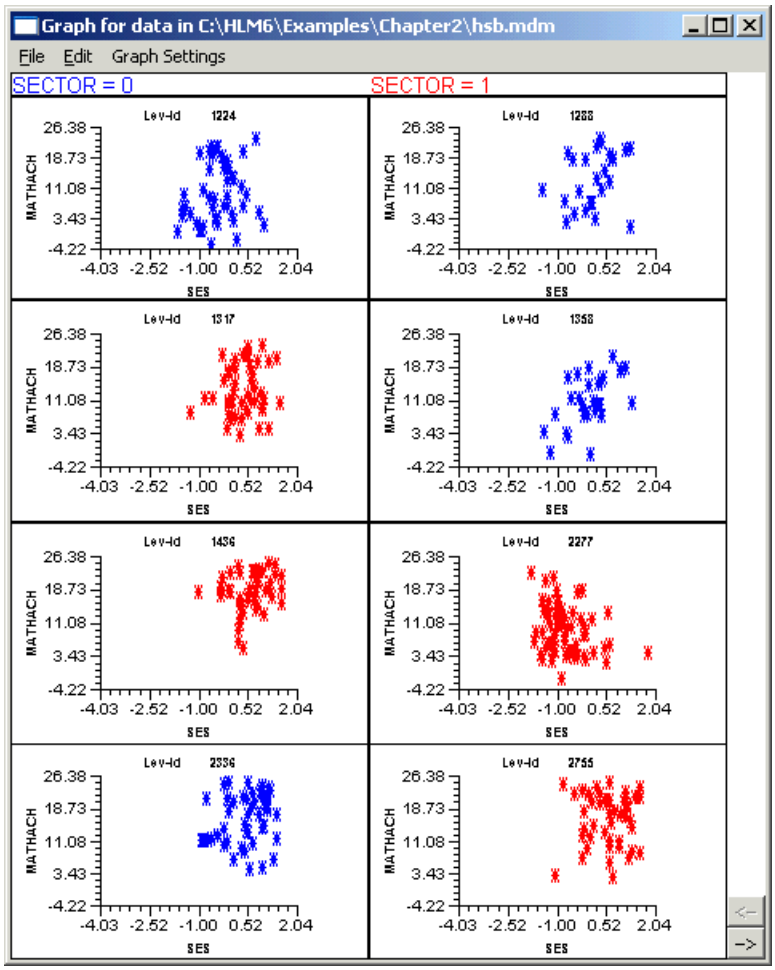
To include a level-2 classification variable

10. After specifying the variables for the x- and y-axis, select the controlling variable from the **Z-focus** drop-down list box. As in the case for the box-and-whisker plots, users can choose either a categorical and continuous controlling variable. In our example, we will choose school sector, Catholic vs. public school, as the controlling variable. To continue working on the scatter plot we have just made, click **Graph Settings** to open the **Equation Graphing** dialog box. Select SECTOR in the **Z-focus** dialog box. The following graph will be displayed.

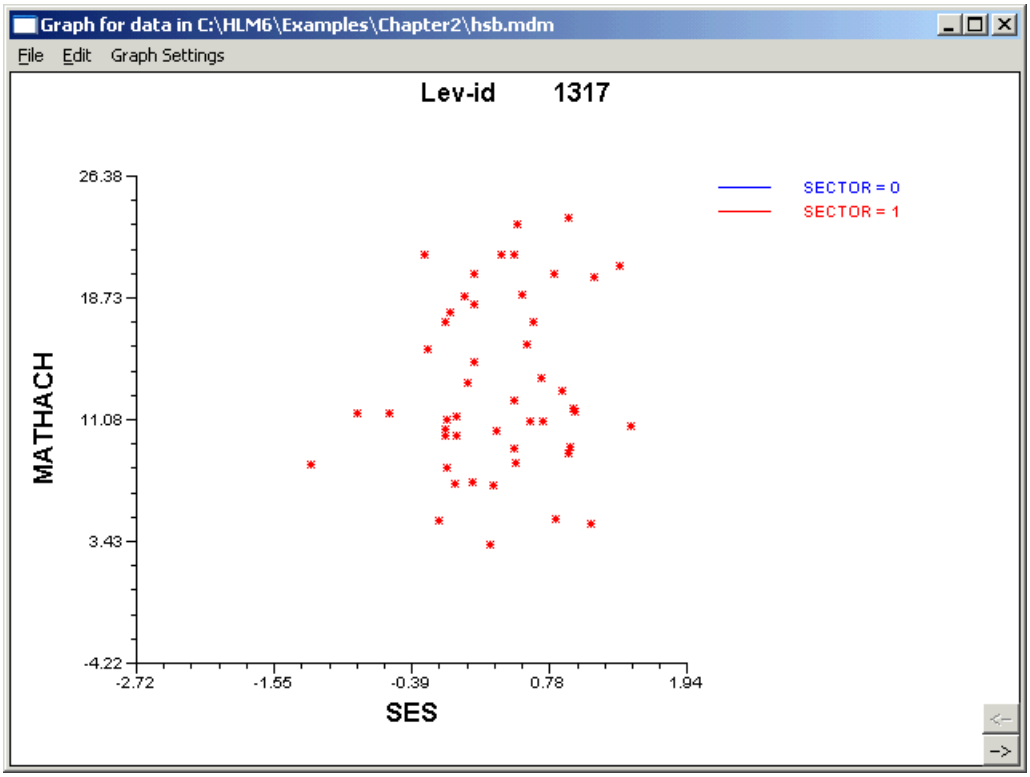


The color-coded scatter plot shows that there is not in general a radical difference in the SES-MATCHACH relationship for the two types of schools.

It may be helpful to use a different pagination option to help us to discern the relationships for these two groups of school. Instead of having all the groups on the same graph, we select the **1 graph/group, multiple/page** pagination option. This gives us the following figure, where we see how the two groups of schools vary in their SES and MATHACH distributions. WHLM puts a maximum of 8 groups in a window. We can page back and forth using the **->** and **<-** buttons in the lower right corner of the window to display the scatter plots for other schools.



As an elaboration of this, we can also choose on the **Graph Settings** dialog box to have each group's plot in a separate graph by choosing **1 graph/group, 1/page**, as shown below:


Graph for data in C:\HLM6\Examples\Chapter2\hsb.mdm
File Edit Graph Settings
Lev-id 1317
SECTOR = 0
SECTOR = 1
MATHACH
26.38
18.73
11.08
3.43
-4.22
-2.72
-1.55
-0.39
0.78
1.94
SES
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