XPost: Excel Workbooks for the
Post-estimation Interpretation of Regression Models
for Categorical Dependent Variables

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- count.xls: *Poisson and Negative Binomial Regression*

About Excel Post-estimation Workbooks

XPost is a series of Excel workbooks that simplify the post-estimation interpretation of regression models for categorical outcomes. The workbooks implement the procedures suggested in:

> J. Scott Long, 1997, *Regression Models for Categorical and Limited Dependent Variables*, Thousand Oaks, CA: Sage Press. (Abbreviated as RMCLDV).

Each workbook includes an example from this book. These workbooks and the documentation you are reading can be obtained at: www.Indiana.edu/~jsl650/post.htm

General Introduction

All of the XPost workbooks work in approximately the same way. First, you enter the estimates computed by a statistical package. Which package you use to estimate your model does not matter. Second, you specify which post-estimation information you want and Excel does the computations. The following documentation begins with the basic ideas that apply to all of the workbooks. We then give detailed

instructions for the binary logit workbook. Finally, less detailed information is provided for each of the other workbooks.

The Workbooks

XPost is currently a set of six Excel workbooks: blogit.xls, bprobit.xls, ologit.xls, glogit.xls, mlogit.xls, and count.xls. These workbooks provide post-estimation analysis for the binary logit, ordered logit, generalized ordered logit, multinomial logit, and two count models (Poisson and negative binomial regression). Versions of the workbooks for other models are planned. In each workbook, you enter the estimates from your model and Excel computes post-estimation statistics, including graphs of predictions. The workbook instructions.xls contains technical documentation for those who want to make major changes to how the workbooks operate.

Each workbook has five worksheets, indicated by the tabs at the bottom of the screen. Hereafter, we refer to these sheets by their name, shown in italics. For example, the worksheet Input will be referred to simply as *Input*. In *Input* you enter information from the estimates for your model. *Calculator* computes predicted values at specified values of the independent variables. *Plotter* plots predicted probabilities as one variable changes holding all other variables at specified values. *Change* calculates the factor and discrete changes in the outcome for given changes in the independent variables. Finally, each workbook has a hidden sheet called *Tech* that does the calculations. Interested users can find the hidden page by the following these menu options: Format → Sheet → Unhide → click OK. (Note: When presenting menu options for Excel, we list the text name on the menu with the hotkey letter underlined. For example, Format indicates the format list on the menu, which can be accessed by pressing [alt-o]). If you change anything on this page, the results are unpredictable and almost certainly incorrect.

Copying a Template

The workbooks that we provide should be used as templates that are *not* changed. Instead, copy a workbook to a file with a different name and make changes only to the new file. For example, if you want to calculate post-estimation results for a binary logit in a project concerning high school students going on to college, copy blogit.xls to college.xls. Or, load blogit.xls in Excel and rename it: File → Save As → Type college.xls and press Enter.

Loading a Workbook

When you load a workbook, Excel asks if you want to enable macros in the workbook. You must click on

 or the workbook will not make the calculations.

Entering Estimates into a Workbook

To use a workbook, you must enter the names and estimates from your model to the *Input* sheet. When you enter the estimates, you should use all of the decimal digits that are available from your output; if you do not, significant rounding errors can occur. In XPost you should only enter information in areas that are light green (these will appear as pale gray in the pictures below).
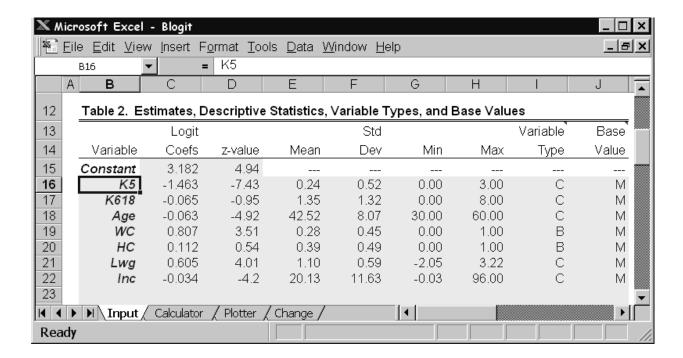
Since entering a lot of information is error prone, we recommend that you copy the estimates from your text editor and paste them into *Input*. We use TextPad (www.textpad.com) and illustrate how to paste information from this program. Other editors work similarly. You can use Microsoft Word for making block copies. To do this, hold down the "Alt" key and use the mouse to select text.

In what follows, we demonstrate only the most basic way to copy and paste information. Experienced users can use tricks to make this faster. For example, the in Excel the sequence: Data → Text to Columns makes it possible to paste multiple columns.

1) Open your output file in TextPad. Enter the commands: Configure → Block Select Mode to turn on block select mode. Then highlight the block of text you want to select. Press [Ctrl-c] to copy the selected information. Here we begin by copying the names of the variables:

```
 TextPad - [D:\XPost\output.log]                                          _ □ ×
 File   Edit   Search   View   Tools   Macros   Configure   Window   Help      _ ë ×
    Ordered logit estimates                       Number of obs    =      1032
                                                   LR chi2(39)      =    750.31
                                                   Prob > chi2      =    0.0000
    Log likelihood = -1367.6995                    Pseudo R2        =    0.2153


    ------------------------------------------------------------------------------
      sexpo |      Coef.   Std. Err.       z     P>|z|      [95% Conf. Interval]
    ---------+--------------------------------------------------------------------
     female |    .154681    .125542     1.232   0.218     -.0913768     .4007388
   catholic |   .4383327   .3156481     1.389   0.165     -.1803261    1.056992
    private |   .1942328   .2422257     0.802   0.423     -.2805209     .6689865
    reading |   .0127519    .010275     1.241   0.215     -.0073867     .0328905
       math |   .0463626   .0108458     4.275   0.000      .0251052     .0676199
      gmath |   .1215213   .0436983     2.781   0.005      .0358742     .2071684
       geng |   .1650454   .0486797     3.390   0.001       .069635     .2604558
    ddadvoc |   .3044404   .2753546     1.106   0.269     -.2352446     .8441255
    ddadsco |   .0840595   .2795916     0.301   0.764     -.4639299     .6320489
    ddadcol |   .1918914   .2200818     0.872   0.383     -.2394609     .6232438
```

2) Switch to Excel and move your cursor to the first cell containing the names of the variables on the *Input* sheet. This is where you will paste the information you copies from TextPad.

☺ **Tip:** [Alt-Tab] switches between opened programs without touching the mouse.

```
 Microsoft Excel - Blogit                                                  _ □ ×
  File   Edit   View   Insert   Format   Tools   Data   Window   Help          _ ë ×
       B16              =   K5
      A     B        C        D        E        F        G        H        I        J
```

	Variable	Logit Coefs	z-value	Mean	Std Dev	Min	Max	Variable Type	Base Value
12	Table 2. Estimates, Descriptive Statistics, Variable Types, and Base Values								
15	*Constant*	3.182	4.94	---	---	---	---	---	---
16	*K5*	-1.463	-7.43	0.24	0.52	0.00	3.00	C	M
17	*K618*	-0.065	-0.95	1.35	1.32	0.00	8.00	C	M
18	*Age*	-0.063	-4.92	42.52	8.07	30.00	60.00	C	M
19	*WC*	0.807	3.51	0.28	0.45	0.00	1.00	B	M
20	*HC*	0.112	0.54	0.39	0.49	0.00	1.00	B	M
21	*Lwg*	0.605	4.01	1.10	0.59	-2.05	3.22	C	M
22	*Inc*	-0.034	-4.2	20.13	11.63	-0.03	96.00	C	M

```
 |◄  ◄  ►  ►|\ Input / Calculator / Plotter / Change /       |◄|
 Ready
```
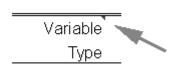
3) Paste the information by pressing [Ctrl-v]. Notice in the picture below that the example data that was included in the workbook is being replaced by new information.

		Logit			Std			Variable	Base
	Variable	Coefs	z-value	Mean	Dev	Min	Max	Type	Value
15	*Constant*	3.182	4.94	---	---	---	---	---	---
16	female	-1.463	-7.43	0.24	0.52	0.00	3.00	C	M
17	catholic	-0.065	-0.95	1.35	1.32	0.00	8.00	C	M
18	private	-0.063	-4.92	42.52	8.07	30.00	60.00	C	M
19	reading	0.807	3.51	0.28	0.45	0.00	1.00	B	M
20	math	0.112	0.54	0.39	0.49	0.00	1.00	B	M
21	gmath	0.605	4.01	1.10	0.59	-2.05	3.22	C	M
22	geng	-0.034	-4.2	20.13	11.63	-0.03	96.00	C	M
23	ddadvoc								

Table 2. Estimates, Descriptive Statistics, Variable Types, and Base Values

4) Continue this process copying and pasting information for the other columns.

- *z-value*. Enter the z-values associated with each of your coefficients. This information is optional.
- *Mean*. Enter the mean values for each right hand size (RHS) variable.
- *Std Dev*. Enter the standard deviations of your RHS variables.
- *Min*. Enter the minimum for each variable; enter 0 if the minimum is unknown.
- *Max*. Enter the maximum for each variable; enter 0 if the maximum is unknown.
- *Variable Type*. Enter "c" if the variable is continuous; "b" if binary.
- *Base Value*. The base values are used to compute post-estimation statistics. Since the models are nonlinear, the values of the base values will affect the value of the statistics that are computed on the *Calculator*, *Plotter*, and *Change* pages. You can enter use the abbreviations: m = mean; min = minimum; max = maximum

For Variable Type and Base Value you should *not* include spaces since these will confuse Excel.

☺ **Tip:** XPost includes comments to help you remember what information should be entered. These are shown by small red triangles in the upper right corner of a call, as illustrated to the left. If you hold the cursor over the triangle, a small help screen will be shown.

Pasting Values from Stata

If you are using Stata to estimate your models, you can use the program xpost.ado that we have written to make it simple to transfer results from Stata to XPost. This program can be obtained by following the instructions for installing the Stata package SPost at: www.indiana.edu/~jsl650/post.htm . To use xpost, simply type the command after estimating the model of interest. xpost will rearrange the output so that the rows and columns of output correspond to the rows and columns in XPost. You can then use the <u>D</u>ata → Te<u>x</u>t to Columns command in Excel.

Case and Spaces

Excel is *not* case sensitive, but extra spaces are considered to be part of the information you enter. For example, when pasting in names if you paste in spaces after the name, you must include those spaces when you refer to that name on other worksheets. The simplest thing is to remove extra spaces entered in the columns Variable, Variable Type, and Base Values. It is easy to remove extra spaces with Excel's Replace command. To do this, highlight the area you want to clean, and enter the commands <u>E</u>dit → Re<u>p</u>lace. A dialogue box will pop up as shown below. Enter a space in the *Find what* box, then click *Replace All* .

☺ **Tip:** XPost has an even easier way to remove spaces. XPost creates its own menu, called (aptly enough) XPost. To access the menu, press [Alt-p]. Select the option <u>R</u>eplace spaces. Alternatively, simply press the keys [Ctrl-Shift-r].

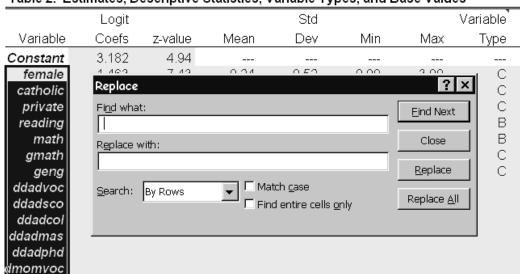Table 2. Estimates, Descriptive Statistics, Variable Types, and Base Values

Variable	Logit Coefs	z-value	Mean	Std Dev	Min	Max	Variable Type
Constant	3.182	4.94	---	---	---	---	---
female	1.463	7.43	0.24	0.53	0.00	3.00	C
catholic							C
private							C
reading							B
math							B
gmath							C
geng							C
ddadvoc							
ddadsco							
ddadcol							
ddadmas							
ddadphd							
dmomvoc							

Replace

Find what: [|]

Replace with: [ ]

Search: [By Rows ▼]

☐ Match case
☐ Find entire cells only

Find Next
Close
Replace
Replace All

Adding Comments

If you want to add notes to a worksheet (e.g., document what the sheet contains), make sure these notes are entered in the areas that are above the line separating rows 11 and 12. Some areas under this line have hidden codes. Changing these codes will create errors in your calculations.

Do* not *Add or Delete Rows or Columns

Adding or deleting rows and columns to the sheets can lead to unpredictable results.
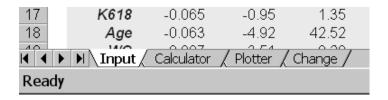
Pull-down Menus

For each worksheet, a pull-down menu is created by pressing [Ctrl-Shift-p] . The menu includes:

- *Reset Pull-Down Menu*. Allows you to hide the pull-down menu.

- Replace Space. Will remove extra spaces.

- *Show / Hide Calculator*. Allows you to hide or to show the Calculator sheet.

- *Show / Hide Plotter*. Allows you to hide or to show the Plotter sheet.

- *Show / Hide Change*. Allows you to hide or to show the Change sheet.

- *About and Help Sources*: Indicates the current version of the workbook.

Changing the Active Sheet

After you have entered your estimates into *Input*, you can use the other sheets. To move from sheet to sheet, click the sheet tabs. The current sheet is shown in white, with the other tabs in gray:

| 17 | *K618* | -0.065 | -0.95 | 1.35 |
| 18 | *Age* | -0.063 | -4.92 | 42.52 |

◄◄ ◄ ► ►◄ \ Input / Calculator / Plotter / Change /

Ready

Save Your File

As usual, remember to save your file when you are done with your work.

blogit.xls: Binary Logit

The Input Sheet

First, enter the information for Table 1, which describes your dependent variable. Since these statistics are not used in other computations, entering this information is optional, but recommended.
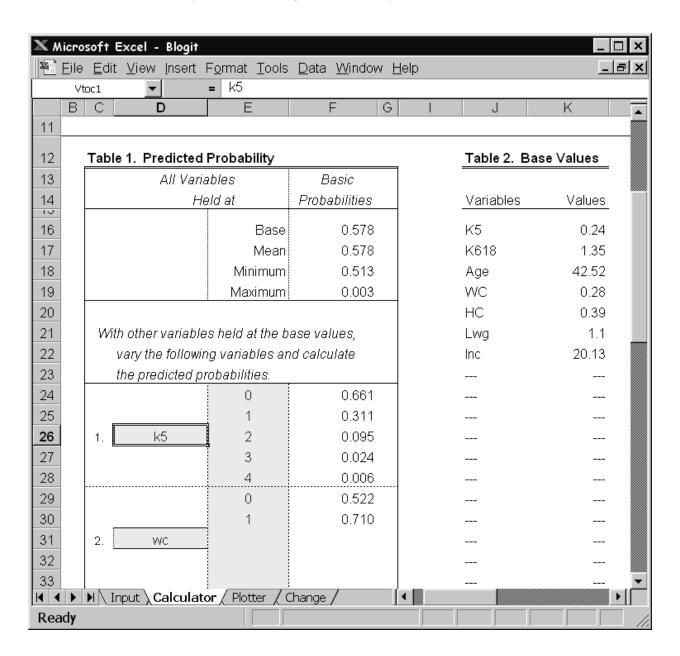
7	Table 1. Descriptive Statistics for Y - *optional* -				
8	Name	Mean	Std	Min	Max
9	*LFP*	0.57	0.50	0.00	1.00
11					

Second, enter the statistics in Table 2. Details are given in the General Overview.
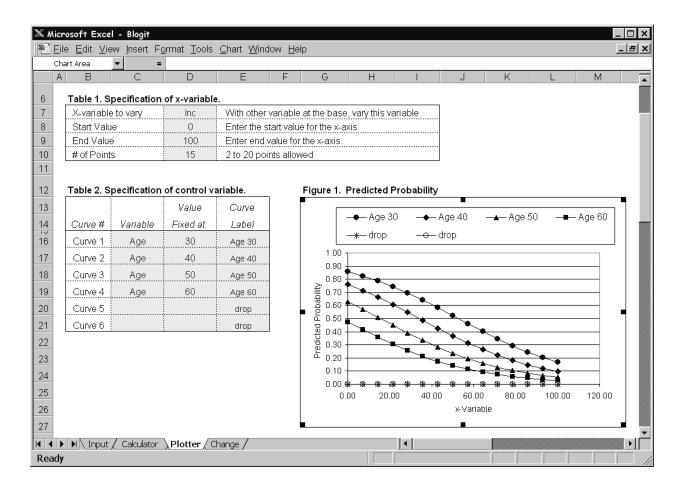
The Calculator Sheet

There are two tables on this sheet. Table 1 contains predicted probabilities calculated at values of the independent variables that you have specified. Table 2 lists the base values that you entered on *Input* in the column Base Values. If you want to change these values, you must do so on the *Input* sheet.

At the top of Table 1, predicted probabilities are calculated with all independent variables held at their base values (as set on the *Input* sheet), means, minimums, and maximums, respectively. In the second part of Table 1, you can pick up to three variables and specify up to five values for each variable. Note that the names of your selected variables must be **exactly** the same as the variable names in *Input*. Extra spaces count. The predicted probabilities are calculated with all other variables held at their base values.

The Plotter Sheet

This sheet plots plot predicted probabilities as one variable changes holding other variables at fixed values. The plot is a standard Excel chart. This means that you can use all of the tools in Excel to modify the format of the chart. Indeed, most people will want to modify the chart the XPost creates. For example, we have found no way to force the maximum value of the x-range to equal the maximum that you specify or to allow the user to specify the name of the x-axis. But, all of these can be control by using standard charting tools in Excel.

1. Enter the information in Table 1 on the variable that will be plotted on the x-axis. The first row requests the name of the "x-variable to vary." Enter the name of one of your independent variables, usually a continuous variable. Remember that extra spaces cause a problem. In the second and third cells, enter the start and end values of your x-variable. Check your descriptive statistics to see the range of this variable. Finally, enter the number of points you want to plot in the fourth cell. This determines the number of symbols (e.g., circles, triangles) shown on the plot. As you enter this information, the plot will change immediately.

2. Up to six curves showing the predicted probability as the x-variable changes can be plotted. Each curve corresponds to specified levels of the other (i.e., not the chosen x-variable) variables. Each curve is defined by the level of one other variable. For example, in the figure above, the predicted probabilities of being in the labor force are plotted as income changes from $0 to $100,000 at four different ages of the respondent. We have labeled the fifth and sixth curves as "drop" to indicate that you will want to remove these curves from the plot.

In the column *Variable*, enter the name of the variable whose value you wish to change from the base values specified on *Input*. In our example there are four levels of age, but the curves do not need to be for different levels of the same variable. That is, you could also include a curve in which the value of some other variable is specified. The specified values of the variable are given in the *Value Fixed At* column and a label for the curve is given in the last column.

To create a single curve, you have to trick the program. To do this, delete all of the information in Table 2 except for Curve 1. For Curve 1, enter any variable, and in the Value Fixed At column, enter the base value from *Input*.

3. Tables 3 and 4 are shown beginning in column S. Table 3 reproduces the base values from *Input*. Table 4 shows the values that will be plotted. You cannot make changes directly to either of these tables.

Modifying a Plot

The plot is like any other chart in Excel. That means, you can customize it using the standard Excel tools for charts.

The Change Sheet

This sheet calculates factor and discrete changes. Table 1 shows the factor change in the odds for changes in each independent variable. Table 2 displays the discrete changes in the probabilities. In this table, all predicted probabilities are calculated with all variables held at their base values as set on *Input*. Discrete changes from 0 to 1 are not calculated if the variable is continuous. For dummy variables, centered unit change and centered standard deviation change are not calculated. Remember, changing the base values must be done on *Input*. Table 3 shows the current base values for each of your independent variables.

bprobit.xls: Binary Probit

This workbook operates almost exactly like blogit.xls, with two exceptions. First, you enter estimates from the probit model (obviously). Second, bprobit.xls does not compute factor change coefficients since these are not appropriate for the probit models.

ologit.xls: Ordered Logit

The Input Sheet

First, enter into Table 1 the descriptive statistics for your dependent variable. While this is optional, it is recommended.

Table 1. Descriptive Statistics for Y - *optional* -

Name	Mean	Std	Min	Max
WARM	2.61	0.93	1.00	4.00

Second, enter into Table 2 the estimated cutpoints and the names of the dependent categories.

Table 2. Cutpoints & Category Names

	Cutpoints	Dependent Category Names	
τ_1	-2.465	y = 1	SD
τ_2	-0.6309	2	DA
τ_3	1.2619	3	AG
τ_4		4	SA
τ_5		5	
τ_6		6	
τ_7		7	
τ_8		8	
τ_9		9	
τ_{10}		10	

 The values estimated for the cutpoints will depend on the parameterization used by the program that estimates the model. Some programs fix the constant to 0 and estimate the first cutpoint; this is illustrated above where the value -2.465 is entered for τ_1 and the constant is entered in Table 3 (shown below). Alternatively, some programs fix $\tau_1=0$ and estimate the constant. In this case, enter 0 in Table 2 for τ_1 and enter the intercept in Table 3.

Third, enter into Table 3 estimates of the regression coefficients and descriptive statistics for the independent variables. Note that up to 50 independent variables are allowed. With the exception of the caveat regarding the constant, the information in Table 3 is entered in the same was as for blogit.xls.

Table 3. Model Estimates, Descriptive Statistics, Variable Types, and Base Values

Variable	Logit Coefs	z-value	Mean	Std Dev	Min	Max	Variable Type	Base Value
Constant			---	---	---	---	---	---
YR89	0.524	6.560	0.400	0.490	0.00	1.00	B	M
MALE	-0.733	-9.340	0.470	0.500	0.00	1.00	B	M
WHITE	-0.391	-3.300	0.880	0.330	0.00	1.00	B	M
AGE	-0.022	-8.780	44.940	16.780	18.00	89.00	C	M
ED	0.067	4.200	12.220	3.160	0.00	20.00	C	M
PRST	0.006	1.840	39.590	14.490	12.00	82.00	C	M

The Calculator Sheet

This sheet operates in the same way as blogit.xls except that for ologit.xls there are predicted probabilities for multiple dependent categories.

The Plotter Sheet

This sheet operates in the same way as blogit.xls except that for ologit.xls there are plots for multiple dependent categories.

The Change Sheet

This sheet operates in the same way as blogit.xls except that for ologit.xls there are discrete change coefficients for multiple dependent categories. The factor change indicates the factor change in the odds for being in higher categories versus lower categories.

oprobit.xls (to be added): Ordered Probit

This workbook works in the same way at ologit.xls. The only differences are that you enter estimates from the ordered probit model and factor change coefficients are not appropriate.

mlogit.xls: Multinomial Logit

While mlogit.xls is similar to other workbooks, you need to be very careful that you understand the base category used in estimating your model. This information is entered on *Input*.

The Input Sheet

First, enter into Table 1 the descriptive statistics for your dependent variable. While this is optional, it is recommended.

Second, when estimating the multinomial logit model, the estimated coefficients show the effect of a variable on a given outcome relative to a base category. The choice of the base category will affect which coefficients are estimated. Different programs select the base category in different ways. While the choice of a base category is arbitrary, you must know what the base category is. See Long (1997: 157-158) for information on determining the base category used by your software. In mlogit.xls, you enter the name (which can be a number) of your base category:

Base Category = [Menial]

Third, enter the descriptive statistics, variable type, and base values for the independent variables. This is done in the same was as for other models.

Fourth, enter the estimated logit coefficients in Table 3. Note that the number of equations (indicated by the columns in the table) is equal to the number of dependent categories minus 1. Each coefficient compares a "given outcome category" to the base category specified earlier. Be sure to indicate the "given outcome category" in the header of each column.

Table 3. Estimates of Logit Coefficients

Contrast Group	Outcome category relative to the base category:			
	BlueCol	Craft	WhiteCol	prof
Constant	0.741	-1.091	-6.239	-11.518
WHITE	1.237	0.472	1.571	1.774
ED	-0.099	0.094	0.353	0.779
EXPER	0.005	0.028	0.035	0.036

The Calculator Sheet

There are two sets of calculations given on this sheet. First, factor change and standardized factor change in the odds are presented in Table 1. In the multinomial logit model, you can estimate the factor change in the odds of any outcome category relative to any other outcome category. In many statistical packages these coefficients are presented for each dependent category relative to the base category. In this table you can request factor change coefficients for any four pairs of outcome categories, referred to as "contrasts"

in the table. In the green cells, shown as gray below, enter the names of the outcomes that you want to compare. Note that you must enter the names exactly as they were entered on the input sheet. Here we show only part of Table 1:

Table 1. Logit Coefficients and Factor Change of Other Contrasts

| Variable | Contrast 1 | | | Contrast 2 | | |
| | BlueCol | vs. | Prof | craft | vs. | WhiteCol |
	b	e^b	e^(b*std)	b	e^b	e^(b*std)
WHITE	-0.538	0.584	0.862	-1.099	0.333	0.738
ED	-0.878	0.415	0.075	-0.259	0.772	0.466
EXPER	-0.031	0.970	0.649	-0.007	0.993	0.908

Second, Table 2 presents information on predicted probabilities. At the top of the table, it shows the predicted probabilities when the independent variables are at their base values, at their minimum, their maximum, and their mean. Recall that these values are entered in Table 2 of *Input*. In the lower half of the table, you can pick an independent variable and specified up to five values for that variable. Predicted probabilities are computed for those values with all other variable held at the base values specified on *Input*. To change base values, go back to *Input* and re-specify the base values in Table 1.

Table 2. Predicted Probability

| | All Variables Held at | Basic Predicted Probability | | | | |
		Menial	BlueCol	Craft	WhiteCol	prof
	Base	0.086	0.186	0.279	0.167	0.281
	Mean	0.094	0.184	0.294	0.161	0.266
	Minimum	0.328	0.516	0.154	0.002	0.000
	Maximum	0.000	0.000	0.006	0.029	0.965

With other variables held at their base values,
vary the following variables and calculate the predicted probabilities at the specified values.

		Menial	BlueCol	Craft	WhiteCol	prof
1. white	0	0.217	0.136	0.439	0.088	0.120
	1	0.086	0.186	0.279	0.167	0.281
2. ed	3	0.122	0.718	0.153	0.007	0.000
	8	0.143	0.514	0.288	0.046	0.009
	13	0.088	0.193	0.284	0.166	0.268
	18	0.006	0.008	0.031	0.066	0.890
	22	0.000	0.000	0.002	0.013	0.984
3. exper	0	0.136	0.268	0.251	0.131	0.215
	5	0.123	0.247	0.259	0.140	0.231
	10	0.110	0.227	0.267	0.149	0.248
	20	0.087	0.188	0.279	0.167	0.280
	30	0.068	0.153	0.285	0.183	0.311

The Plotter Sheet

This sheet plots predicted probabilities as one independent variable changes holding all other variables at their base value. In Table 1, you ender the name of the variable that changes, its start value, end value, and the number of points to plot. Two tables and a figure are shown. Table 2 shows the base values (to change the base values, go to *Input* and re-specify the values under the column *Base Value*. Table 2 shows the values that are being plotted. Figure 1 presents the predicted probabilities as one variable changes. This figure can be edited within Excel to meet your needs.

The Change Sheet

This sheet calculates factor and discrete changes. Table 1 shows factor change in the odds of each outcome relative to the base category for either a unit change or a standard deviation change in a given independent variable. The column labeled "Type of Change" indicates if you want the coefficient for a unit change (enter a U) or a standard deviation change (enter an S). Table 2 calculates discrete changes in the predicted probabilities, all variables held at their bases. Base values are shown in Table 3 and were entered on the *Input* sheet. Discrete changes from 0 to 1 will not be calculated if the variable is continuous. For dummy variables, centered unit change and centered standard deviation change will not be calculated. Note: $0 \rightarrow 1$ indicates a change from 0 to 1; $\Delta 1$ indicates a centered change of 1 around the base value; $\Delta \sigma$ is centered change of 1 standard deviation around the base value. ΔRange is change from the minimum to maximum. Average Δ is the average absolute discrete change.

glogit.xls: Generalized Ordered Logit

This workbook operates in almost the same way as mlogit.xls. Please refer to the documentation for that workbook.

The Input Sheet

There are no new issues involved in entering data for glogit.xls.

The Calculator Sheet

This sheet computes predicted probabilities in the same way as Table 2 for mlogit.xls.

The Plotter Sheet

This sheet operates in the same way as mlogit.xls.

The Change Sheet

This sheet computes predicted probabilities in the same way as Table 2 for mlogit.xls.

count.xls: Poisson and negative binomial count models.

This workbook is slightly different from the others in that you can enter the estimates from two models, the Poisson and NB, at the same time. This makes it very simple to compare the results of these two models.

The Input Sheet

First, in Table 1 enter descriptive statistics for your dependent variable. In Table 2 enter descriptive statistics, variable type, and base values for the independent variables.

Second, in Table 3, enter estimates from the Poisson regression model. If you are only interested in the NB model, you can leave this table blank. In Table 4, enter estimates from the NB regression model.

Under *Alpha*, enter the estimated α value. If you are only interested in the Poisson model, you can leave this table blank.

Third, in Table 5, you can optionally enter the observed probabilities for your dependent variable. These values are used by *Plotter* to compare observed and predicted counts.

The Calculator Sheet

This sheet computes predicted probabilities for each count. At the top of the sheet, you enter the highest count value that you are interested in. For example, if you are interested in predicted probabilities for counts form 0 to 10, you enter 10. The top part of Table 1 computes predicted counts with the independent variables at their mean, minimum, maximum, and base values. The lower part of Table 2 computes predicted probabilities with all variables at their base values except for one variable. You can specify up to five values of this variable to see how changes in this variable affect the predicted probabilities.

The Plotter Sheet

This sheet plots observed and predicted probabilities for each count value. Some basic information is required for your plot. The first piece of information is the number of count values that you want to plot. This is usually equal to the number in the count for which you have observed probabilities (see Columns T and U in the *Input* page).

We provide three ways to compare the observed proportions to predictions. In all cases the observed proportions are shown on the plot. You are given three choices:

(2) (1) Univariate Mean; (2) Regression Mean; (3) Hypothetical Mean: (20)

- Option 1-Univariate Mean: computes the predicted probabilities from the Poisson and Negative binomial distributions using the observed mean of the dependent variable. The α value estimated by the regression is used in computing probabilities for the negative binomial distribution..

- Option 2-Regression Mean: computes the predicted probabilities from the Poisson and Negative binomial distributions using the predicted rate from the regression models when all independent variables are held at their base values. The α value estimated by the regression is used in computing probabilities for the negative binomial distribution.

- Option 3-Hypothetical Mean: allows you to plot predictions with any mean value that you chose, again using the α value estimated by the regression.

Three curves are then plotted in Figure 1. The specific values plotted are given in Table 1. You need to re-specify the figure if you have a different number of counts. To do this, click on the figure, and go to Chart → Source Data. Table 2 displays the base values of your independent variables from the *Input* sheet. Again, if you want to change the base values, go back to the *Input* page and re-specify the *Base Value* column.

The Change Sheet

This page calculates factor and discrete changes. Table 1 shows the factor and discrete changes in the mean count (i.e., the rate) for changes in each independent variable for Poisson regression. Table 2 displays the same statistics for Negative Binomial regression. All predictions are calculated with all variables held at their base values, as entered in *Input* and shown in Table 3. Discrete changes from 0 to 1 will not be calculated if the variable is continuous. For dummy variables, centered unit change and centered standard deviation change will not be calculated.