Graphics tricks for models

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Show two new Stata graphics tools

- Plotting marginal effects and predictive margins using marginsplot
- Making contour plots via twoway contour and twoway contourline
Getting Started

- This will be an interactive demonstration
  - This will help show some of the new interface as well as some other new tools

- Start by opening up the nhanes2 dataset
  - `webuse nhanes2`
    - Good for continuation from yesterday

- These are survey data
  - `svyset`
    - We will need to use the `svy:` prefix for estimation
The margins command is great!
- Can easily compute averaged predicted values
- Can easily compute average marginal effects
- Both of these make tables of values

Curse the margins command!
- The tabular output can be difficult to read
A Simple Regression with a Quadratic

Here is a simple model for BMI as a function of age and sex:

\[ \text{svy: regress bmi c.age##c.age i.sex} \]

Can see that the parabola is concave down, and that women have smaller BMIs than men.
We can take a look at the predictive margins at several ages within each sex.

\[
\text{margins, at(age==(25(10)75)) over(sex)}
\]

- **Note:** Because of using `svy`, we should really be specifying `vce(unconditional)` for all these examples; this is being left off to keep the commands short.

- It looks like the differences between sexes are constant (as expected).

- As one would expect from the concave-down parabola the BMI’s increase and then decrease.
We can get a much better look at the margins by using the `marginsplot` command.

Here it is in its simplest form:
```
marginsplot
```

![Predictive Margins with 95% CIs](image)
The default behavior is to
- Draw a connected-line plot
- Draw pointwise confidence intervals at each point

Stata is bright enough to use the `at()` variable for the $x$-axis and to overlay the two curves.
Switching Axes

- We can change this default behavior, of course.
- Here are the same data in a less-useful form (though it shows the constant offset for the females).
  `. marginsplot, x(sex)

![Predictive Margins with 95% CIs](image)
We can also make a finer grid and omit the points.

We’ll also turn off the CIs here.

```
. quietly margins, at(age==(25(5)75)) over(sex)
. marginsplot, noci
```
We can also look at average marginal effects.

. quietly margins, at(age==(25(5)75)) dydx(age)
. marginsplot, noci
Looking at a Logit

- Working with something which is non-linear in the natural (not the model) measure is a bit more interesting.

- Here is a simple logistic regression
  
  . svy: logistic diabetes age i.(race sex)
The Predictive Margins are More Interesting

- Now the predictive margins are more interesting
  
  . quietly margins, at(age==(25(5)75)) over(race sex)
  . marginsplot, noci

![Predictive Margins Graph](image)
Making Side-by-Side graphs

- We can use `plotdimension()` option to make side-by-side graphs.
- This graphs race by sex.
  
  ```
  . marginsplot, noci plot(race)
  ```

![Predictive Margins Graph](image-url)
Now for Something Complicated

- We’ll now fit a model with (too) many interactions
  . `svy: logit diabetes c.age##c.age##race##sex`
- Looking at the interaction terms is nearly worthless
  - This is probably getting close to overfitting
Here are the same set of margins applied to this different model.

```stata
. quietly margins, at(age=(20(5)75)) over(race sex)
. marginsplot, noci recast(line)
```

![Predictive Margins](image)
Contour Plots

- Stata 12 now has both filled contour plots and contour line plots
- These are both `twoway` plots
  - `twoway contour` for filled contour plots
  - `twoway contourline` for contour line plots
- They are in the `twoway` dialog
A Simple Example Dataset

- Here is a dataset meant to be artificial mountains
  - use mtns
- These are heights of mountains measured on this grid
  - scatter y x
Making a Filled Contour

- Here is the default filled contour
  
  . twoway contour z y x

- Note: If this displays with line artifacts, turn off anti-aliasing in your pdf viewer—this is a known limitation of pdfs.
Making the Contour Prettier

- Adding many levels smooths the color gradations
  - `. twoway contour z y x, levels(40)`
- This makes the legend a bit absurd, though
- We should shut off the legend and change the aspect ratio
This looks quite good

```
. twoway contour z y x, levels(40) clegend(off) xsize(5) ysize(5)
```

![Contour Plot](image)
Contour line plots outline elevations instead of filling them in.
They work best with color lines on.
```
twoway contourline z y x, levels(40) colorlines plegend(off)
```
The artificial mountain dataset was defined on a grid

Both *twoway contour* and *twoway contourline* will use interpolation to fill the rest of the plot region if the data are not on a grid

Let’s look at this Excel file about a sandstone stratum under Ohio

First we’ll bring it into Stata

```
.import excel using sandstone, firstrow
```
Looking at it, there are gaps in the grid
  . `scatter northing easting`
We can still make a contour plot from this:
```
twoway contour depth northing easting
```

![Contour Plot](image-url)
We should take a look at the help for contour plots

The help files have been spruced up, so that we can skip to the Remarks right away!
Believe it or not, it is possible to make a contour plot of predictive margins.
. do margcon2

Here is the picture