

How can I perform post-hoc pairwise comparisons of adjusted means in Stata?

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Post-hoc pairwise comparisons of adjusted means in Stata refer to a statistical analysis technique that allows researchers to compare the means of multiple groups after controlling for other variables. This process involves adjusting the means for potential confounding factors and then conducting pairwise comparisons between each group. This method is useful for identifying significant differences between groups and understanding the effects of different variables on the outcome of interest. Stata provides a user-friendly platform for performing post-hoc pairwise comparisons of adjusted means, making it a valuable tool for researchers in various fields.

FAQ: How can I do post-hoc pairwise comparisons of adjusted means in Stata?

Stata FAQ: How can I do post-hoc pairwise comparisons of adjusted means in Stata?

This FAQ will cover doing pairwise comparisons for adjusted means and will make use of the margins and pwcompare commands.

We will demonstrate the pairwise comparisons of adjusted means using the hsbdemo dataset with prog (program type) as the categorical variable and read as the continuous covariate.

We will begin by running a model without the covariate so that we can see the differences in the unadjusted means.

use <https://stats.idre.ucla.edu/stat/data/hsbdemo>, clear

tabstat write, by(prog) stat(n mean sd)

Summary for variables: write

by categories of: prog (type of program)

prog | N mean sd

```
-----+-----
general | 45 51.33333 9.397775
academic | 105 56.25714 7.943343
vocation | 50 46.76 9.318754
-----+-----
Total | 200 52.775 9.478586
-----
```

anova write prog

Number of obs = 200 R-squared = 0.1776

Root MSE = 8.63918 Adj R-squared = 0.1693

Source | Partial SS df MS F Prob > F

```
-----+-----
Model | 3175.69786 2 1587.84893 21.27 0.0000
|
prog | 3175.69786 2 1587.84893 21.27 0.0000
```

|
Residual | 14703.1771 197 74.635417

-----+-----

Total | 17878.875 199 89.843593

margins prog // view cell means

Adjusted predictions Number of obs = 200

Expression : Linear prediction, predict()

 | **Delta-method**

| **Margin Std. Err. z P>|z|**

-----+-----

prog |

1 | 51.33333 1.287853 39.86 0.000 48.80919 53.85748

2 | 56.25714 .8430976 66.73 0.000 54.6047 57.90958

3 | 46.76 1.221764 38.27 0.000 44.36539 49.15461

pwcompare prog, mcompare(tukey) effects // pairwise comparisons

Pairwise comparisons of marginal linear predictions

Margins : asbalanced

```

-----
| Number of
| Comparisons
-----+-----
prog | 3
-----

-----
| Tukey Tukey
| Contrast Std. Err. t P>|t|
-----+-----
prog |
2 vs 1 | 4.92381 1.539279 3.20 0.005 1.288703 8.558916
3 vs 1 | -4.573333 1.775183 -2.58 0.029 -8.765543 -
.3811241
3 vs 2 | -9.497143 1.484426 -6.40 0.000 -13.00271
-5.991573
-----

```

Note: The tukey method requires balanced data for proper level coverage. A factor was found to be unbalanced.

With unbalanced data the `tukey` option in `pwcompare` produces the Tukey-Kramer solution.

Next, we add the covariate to the model. The `margins` and `pwcompare` commands take into account the covariate in the model to produce the cell means and the pairwise differences.

```
anova write prog c.read
```

```
Number of obs = 200 R-squared = 0.3925
```

```
Root MSE = 7.44408 Adj R-squared = 0.3832
```

```
Source | Partial SS df MS F Prob > F
```

```
-----+-----
```

```
Model | 7017.68123 3 2339.22708 42.21 0.0000
```

```
|
```

```
prog | 650.259965 2 325.129983 5.87 0.0034
```

```
read | 3841.98338 1 3841.98338 69.33 0.0000
```

```
|
```

```
Residual | 10861.1938 196 55.4142539
```

```
-----+-----
```

```
Total | 17878.875 199 89.843593
```

margins prog, asbalanced

Predictive margins Number of obs = 200

Expression : Linear prediction, predict()

| Delta-method

| Margin Std. Err. z P>|z|
 -----+

prog |

1 | 52.50272 1.118549 46.94 0.000 50.31041 54.69504

2 | 54.39898 .7599706 71.58 0.000 52.90946 55.88849

3 | 49.6097 1.106984 44.82 0.000 47.44005 51.77934

pwcompare prog, mcompare(tukey) effects

Pairwise comparisons of marginal linear predictions

Margins : asbalanced

| Number of

| Comparisons
 -----+

prog | 3

| Tukey Tukey

| Contrast Std. Err. t P>|t|

prog |

2 vs 1 | 1.896256 1.375278 1.38 0.354 -1.351677 5.14419

3 vs 1 | -2.893026 1.542866 -1.88 0.149 -6.536747
.7506945

3 vs 2 | -4.789282 1.39847 -3.42 0.002 -8.091988
-1.486576

Note: The tukey method requires balanced data for proper level coverage. A factor was found to be unbalanced.

Once again, with unbalanced data the tukey option in pwcompare produces the Tukey-Kramer solution.