How can I do multivariate repeated measures in Stata?

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Multivariate repeated measures in Stata refers to the statistical method used to analyze data with multiple dependent variables that are measured repeatedly over time or under different conditions. This technique allows for the examination of the relationship between multiple variables and their changes over time, while also taking into account the correlation between the repeated measures. To perform multivariate repeated measures in Stata, one can use various commands and procedures, such as the "mixed" command, to account for within-subject correlation and estimate the effects of both within and between-subject factors. This approach is commonly used in longitudinal studies or experiments with multiple dependent variables, and can provide valuable insights into the relationships and changes between variables over time.

How can I do multivariate repeated measures in Stata? | Stata FAQ

Using the manova command along with transformations of the dependent variables will allow you to perform multivariate repeated measures analyses.

Example 1

The first example is a within-subjects design, also known as a randomized block design. There are four observations for each subject, labeled y1, y2, y3 and y4.

```
clear
input s y1 y2 y3 y4
1 3 4 4 3
2 2 4 4 5
3 2 3 3 6
```

4 3 3 3 5
5 1 2 4 7
6 3 3 6 6
7 4 4 5 10
8 6 5 5 8
end

We need to create a variable to use as a constant and then run the manova with the noconstant option.

generate con = 1
manova y1 y2 y3 y4 = con, noconstant

Number of obs = 8

W = Wilks' lambda L = Lawley-Hotelling trace
P = Pillai's trace R = Roy's largest root

Source | Statistic df F(df1, df2) = F Prob>F
-----------+--
con | W 0.0196 1 4.0 4.0 49.92 0.0011 e
| P 0.9804 4.0 4.0 49.92 0.0011 e
| L 49.9217 4.0 4.0 49.92 0.0011 e
| R 49.9217 4.0 4.0 49.92 0.0011 e
|--

Residual | 7

-----------+--

Total | 8

----

e = exact, a = approximate, u = upper bound on F

Next, we need to create contrasts among the dependent variables. If there are k dependent variables, we will create k-1 contrasts. These contrasts are created in a manner similar to that which is done with categorical predictors. We will create the contrasts using effect coding.

mat ycomp = (1,0,0,-1,1,0,-1,0,1,-1)
mat list ycomp

ycomp
c1 c2 c3 c4
r1 1 0 0 -1
r2 0 1 0 -1
r3 0 0 1 -1

manovatest con, ytrans(ycomp)

Transformations of the dependent variables

(1) y1 - y4
(2) y2 - y4
(3) y3 - y4

W = Wilks' lambda L = Lawley-Hotelling trace
P = Pillai's trace R = Roy's largest root

Source | Statistic df F(df1, df2) = F Prob>F
-----------+--
con | W 0.2458 1 3.0 5.0 5.11 0.0554 e
| P 0.7542 3.0 5.0 5.11 0.0554 e
| L 3.0682 3.0 5.0 5.11 0.0554 e
| R 3.0682 3.0 5.0 5.11 0.0554 e
|--
Residual | 7

The F-test of 5.11 is the multivariate test of the within-subjects treatment. The result is not significant
at the .05 level.

Example 2

This example will include one between-subjects factor with two levels. The design could be classified as a split-plot factorial.

clear
input s a y1 y2 y3 y4
1 1 3 4 7 7
2 1 6 5 8 8
3 1 3 4 7 9
4 1 3 3 6 8
5 2 1 2 5 10
6 2 2 3 6 10
7 2 2 4 5 9
8 2 2 3 6 11
end

The first manova is a test of the between-subjects factor.

manova y1 y2 y3 y4 = a

Number of obs = 8

W = Wilks' lambda L = Lawley-Hotelling trace
P = Pillai's trace R = Roy's largest root

Source | Statistic df F(df1, df2) = F Prob>F

-----------+---

a | W 0.1374 1 4.0 3.0 4.71 0.1169 e

| P 0.8626 4.0 3.0 4.71 0.1169 e

| L 6.2764 4.0 3.0 4.71 0.1169 e

| R 6.2764 4.0 3.0 4.71 0.1169 e

|---

Residual | 6

-----------+---

Total | 7

----

e = exact, a = approximate, u = upper bound on

The between-subjects factor is not significant. Next, we code the contrasts among the dependent variables and test for the a*y interaction (between-subject*within-subjects) interaction.

mat ymat = (1,0,0,-1,1,0,-1,0,1,-1)

mat list ymat

ymat

c1 c2 c3 c4

r1 1 0 0 -1

r2 0 1 0 -1

r3 0 0 1 -1

/* test of the a*y interaction */

manovatest a, ytransform(ymat)

Transformations of the dependent variables
(1) y1 - y4
(2) y2 - y4
(3) y3 - y4

W = Wilks' lambda L = Lawley-Hotelling trace
P = Pillai's trace R = Roy's largest root

Source | Statistic df F(df1, df2) = F Prob>F
-----------+--
a | W 0.1443 1 3.0 4.0 7.91 0.0371 e
| P 0.8557 3.0 4.0 7.91 0.0371 e
| L 5.9296 3.0 4.0 7.91 0.0371 e
| R 5.9296 3.0 4.0 7.91 0.0371 e
|---
Residual | 6
----
e = exact, a = approximate, u = upper bound on F

Even though the interaction is significant, we will go ahead and test the effect of the within-subjects variable. To do this we will create a contrast for the predictor variables, such that, the levels of each variable sums to one.

/* test of y */

mat xmat = (1, .5, .5)
mat list xmat

xmat
c1 c2 c3
r1 1 .5 .5

manovatest, test(xmat) ytransform(ymat)

Transformations of the dependent variables
(1) y1 - y4
(2) y2 - y4
(3) y3 - y4

Test constraint
(1) _cons + .5 a + .5 a = 0

W = Wilks' lambda L = Lawley-Hotelling trace

P = Pillai's trace R = Roy's largest root

Source | Statistic df F(df1, df2) = F Prob>F

-----------+--

manovatest | W 0.0275 1 3.0 4.0 47.19 0.0014 e

| P 0.9725 3.0 4.0 47.19 0.0014 e

| L 35.3944 3.0 4.0 47.19 0.0014 e

| R 35.3944 3.0 4.0 47.19 0.0014 e

|--

Residual | 6

The test of the within-subjects factor is also significant, although care must be taken in interpreting this result due to the significant interaction effect.