

Figure 1.36

MULTIVARIATE TEST FOR HOMOGENEITY OF DISPERSION MATRICES

BOXS M = 114.53559
 F WITH (36,2404) DF = 2.67721, P = .000 (APPROX.)
 CHI-SQUARE WITH 36 DF = 98.09416, P = .000 (APPROX.)

1.37 Multivariate Analysis of Covariance

MANOVA will also perform a multivariate analysis of covariance. Figure 1.37a illustrates this use of MANOVA.

Figure 1.37a

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RUN NAME      DENTAL CALCULUS DATA FROM FINN(1974) PAGE C-56
FILE NAME     DATA FOR ANTI-CALCULUS AGENT
VARIABLE LIST YEAR,TR,RCAN,RLI,RCI,LCI,LLI,LCAN
INPUT FORMAT  FIXED(2F1.0,6F2.0)
N OF CASES    107
MISSING VALUES YEAR TO LCAN(BLANK)
MANOVA        RCAN,RLI,RCI BY YEAR(1,2),TR(1,5) WITH LCI/
READ INPUT DATA
11 2 2 1 2 2 1
11 0 0 0 2 1 0
11 0 0 4 4 0 0
11 2 2 2 3 2 2
. . . . .
. . . . .
. . . . .
23 0 1 3 4 3 0
23 1 0 1 0 1 0
23 0 1 0 0 0 0
23 0 1 6 4 1 0
FINISH

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RCAN, RLT, and RCI are the response variables and LCI the covariate in this example. The discussion of univariate analysis of covariance in Section 1.17 can be generalized.

When a covariate is specified, multivariate significance testing and parameter estimation are adjusted for the covariate; i.e., both S_h and S_e are adjusted. For the dental calculus data, the multivariate significance tests for the TR effect, adjusted for the covariate LCI, are given in Figure 1.37b.

Figure 1.37b

EFFECT .. TR

MULTIVARIATE TESTS OF SIGNIFICANCE (S = 3, M = 0, N = 47 1/2)

TEST NAME	VALUE	APPROX. F	HYPOTH. DF	ERROR DF	SIG. OF F
PILLAIS	.18149	1.59371	12.00	297.00	.092
HOTELLINGS	.20468	1.63178	12.00	287.00	.082
WILKS	.82485	1.61631	12.00	256.93	.087
ROYS	.13641				

EIGENVALUES AND CANONICAL CORRELATIONS

ROOT NO.	EIGENVALUE	PCT.	CUM. PCT.	CANON. COR.
1	.15796	77.17431	77.17431	.36934
2	.04095	20.00838	97.18269	.19835
3	.00577	2.81731	100.00000	.07572

DIMENSION REDUCTION ANALYSIS

ROOTS	WILKS LAMBDA	F	HYPOTH. DF	ERROR DF	SIG. OF F
1 TO 3	.82485	1.61631	12.00	256.93	.087
2 TO 3	.95515	.75412	6.00	237.72	.607
3 TO 3	.99427	.28215	2.00	196.00	.754

UNIVARIATE F-TESTS WITH (4,99) D. F.

VARIABLE	HYPOTH. SS	ERROR SS	HYPOTH. MS	ERROR MS	F	SIG. OF F
RCAN	4.20875	119.32324	1.05219	1.20529	.87298	.483
RLI	4.15057	152.39986	1.03764	1.53939	.67406	.612
RCI	18.00210	123.66477	4.50052	1.24914	3.60290	.009