A12.3 (*CD-ROM TOPIC*) USING SPSS FOR CHI-SQUARE TESTS AND NONPARAMETRIC TESTS

Using SPSS for Chi-Square Tests

You can use SPSS to construct contingency tables and perform chi-square tests on raw (unsummarized) data. As an example, open the **MUTUALFUNDS2004.SAV** file. Select **Analyze ➔ Descriptive Statistics ➔ Crosstabs**.

1. In the Crosstabs dialog box (see Figure A12.10), enter **Objective** in the Row(s): edit box and **Fees** in the Column(s): edit box. Click the **Statistics** button.

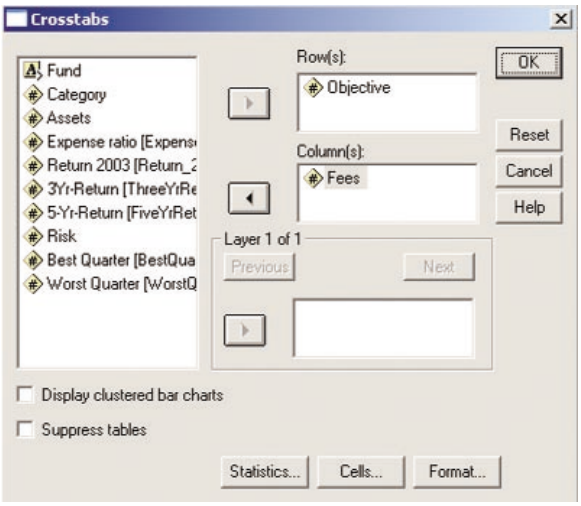

FIGURE A12.10 SPSS Crosstabs Dialog Box

2. In the Crosstabs: Statistics dialog box (see Figure A12.11), select the **Chi-square** check box. (If you have related samples, select the **McNemar** check box.) Click the **Continue** button. Click the **Cells** button.

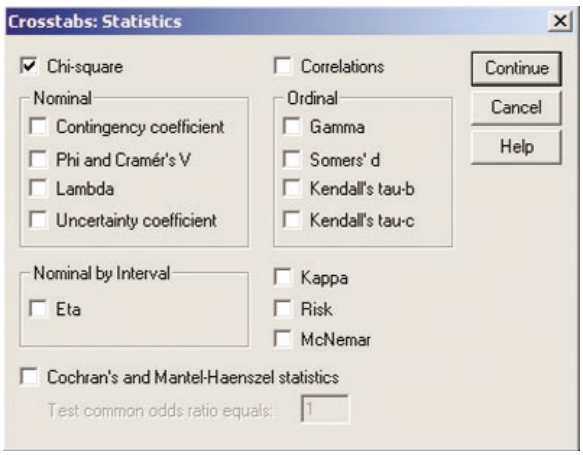

FIGURE A12.11 SPSS Crosstabs: Statistics Dialog Box

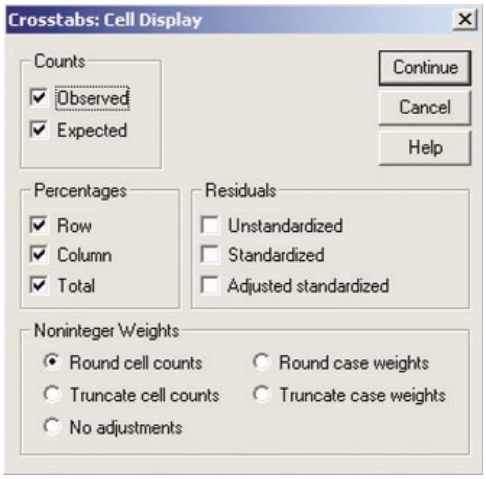

FIGURE A12.12 SPSS Crosstabs: Cell Display Dialog Box

3. In the Crosstabs: Cell Display dialog box (see Figure A12.12), select the **Observed, Expected, Row, Column**, and **Total** check boxes. Click the **Continue** button. Click the **OK** button.

Figure A12.13 illustrates the SPSS output.

Using SPSS for the Wilcoxon Rank Sum Test

You can use SPSS to test the difference between the medians of two groups. To illustrate the test of hypothesis for the difference in the median cola sales for the two aisle locations on page 481, open the **COLA.SAV** file.

1. You first need to stack the data with sales in one column and display type in a different column. Copy the sales for the display into a new column with the sales for the normal display in rows 1–10 and the sales for the endaisle display in rows 11–20. Label this column **sales**. Then, in another column (labeled **display**), enter **0** in rows 1–10 and enter **1** in rows 11–20. Click the **Variable View** sheet tab.
2. In the Type column in the display row, click **Numeric** and then click the **. . . tab**. In the Variable Type: edit box, select the **Numeric** option button. Click the **OK** button.
3. In the Values column in the display row, click **None** and then click the **. . . tab**. In the Value Labels dialog box, enter **0** in the Value: edit box and **Normal** in the Value Label: edit box. Click the **Add** button. Now enter **1** in the Value: edit box and **Endaisle** in the Value Label: edit box. Click the **Add** button. Click the **OK** button. Click the **Data View** tab.

Objective * Fees Crosstabulation

			Fees		
			No	Yes	Total
Objective	Growth	Count	40	9	49
		Expected Count	39.3	9.7	49.0
		% within Objective	81.6%	18.4%	100.0%
		% within Fees	41.2%	37.5%	40.5%
		% of Total	33.1%	7.4%	40.5%
	Value	Count	57	15	72
		Expected Count	57.7	14.3	72.0
		% within Objective	79.2%	20.8%	100.0%
		% within Fees	58.8%	62.5%	59.5%
		% of Total	47.1%	12.4%	59.5%
Total		Count	97	24	121
		Expected Count	97.0	24.0	121.0
		% within Objective	80.2%	19.8%	100.0%
		% within Fees	100.0%	100.0%	100.0%
		% of Total	80.2%	19.8%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.112[b]	1	.738		
Continuity Correction[a]	.010	1	.919		
Likelihood Ratio	.112	1	.738		
Fisher's Exact Test				.819	.463
Linear-by-Linear Association	.111	1	.739		
N of Valid Cases	121				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.72.

FIGURE A12.13 SPSS Output for a Two-Way Contingency Table

4. Select **Analyze ➔ Nonparametric Tests ➔ 2 Independent Samples**. In the Two-Independent-Samples Tests dialog box (see Figure A12.14), enter **sales** in the Test Variable List: edit box and **display** in the Grouping Variable: edit box. Select the **Define Groups** button.

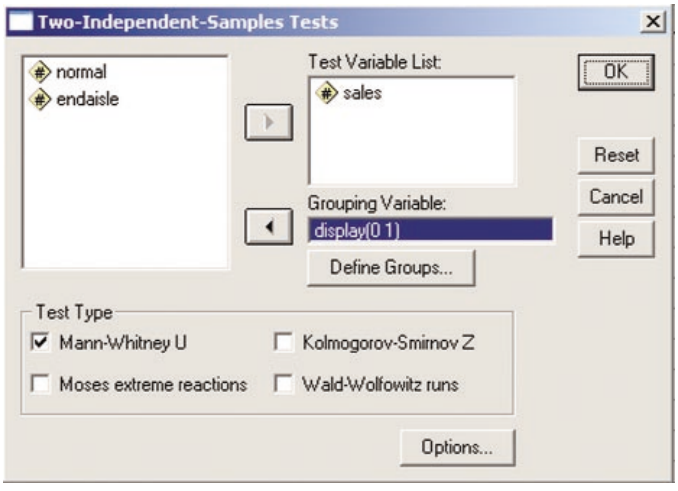

FIGURE A12.14 SPSS Two-Independent Samples Tests Dialog Box

5. In the Define Groups dialog box, enter **0** in the Group 1: edit box and **1** in the Group 2: edit box. Click the **Continue** button to return to the Two-Independent-Samples Tests dialog box. Select the **Mann-Whitney U** check box. Click the **OK** button.

Figure A12.15 illustrates SPSS output for the cola sales data.

Mann-Whitney Test

Ranks

	display	N	Mean Rank	Sum of Ranks
sales	Normal	10	7.20	72.00
	Endaisle	10	13.80	138.00
	Total	20		

Test Statistics[b]

	sales
Mann-Whitney U	17.000
Wilcoxon W	72.000
Z	-2.496
Asymp. Sig. (2-tailed)	.013
Exact Sig. [2*(1-tailed Sig.)]	.011[a]

a. Not corrected for ties.

b. Grouping Variable: display

FIGURE A12.15 SPSS Output for the Cola Sales Data

Using SPSS for the Wilcoxon Signed Ranks Test

To use SPSS for the Wilcoxon signed ranks test, open the **COMPTIME.SAV** file. Select **Analyze➔ Nonparametric Tests ➔ 2 Related Samples**. In the Two-Related-Samples Tests dialog box (see Figure A12.16), enter **current** and **new** in the Test Pair(s) List: dialog box. Select the **Wilcoxon** check box. Click the **OK** button.

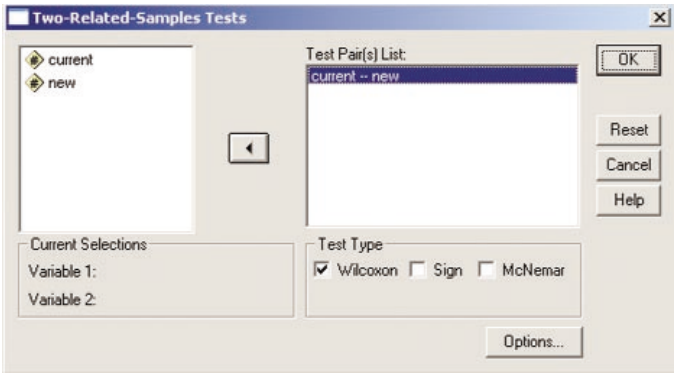

FIGURE A12.16 SPSS Two-Related-Samples Tests Dialog Box

Figure A12.17 illustrates SPSS output for the financial packages data.

Ranks

		N	Mean Rank	Sum of Ranks
new - current	Negative Ranks	8[a]	5.50	44.00
	Positive Ranks	1[b]	1.00	1.00
	Ties	1[c]		
	Total	10		

a. new < current

b. new > current

c. new = current

Test Statistics[b]

	new - current
Z	-2.549[a]
Asymp. Sig. (2-tailed)	.011

a. Based on positive ranks.

b. Wilcoxon Signed Ranks Test

FIGURE A12.17 SPSS Output of the Wilcoxon Signed Ranks Test for the Financial Packages Data

Using SPSS for the Kruskal-Wallis Test

To illustrate the Kruskal-Wallis test, open the **PARACHUTE.SAV** file. You first need to stack the data with strength in one column and supplier number in a different column.

1. Copy the strength into a new column with the strength for Supplier 1 in rows 1–5, the strength for Supplier 2 in rows 6–10, the strength for Supplier 3 in rows 11–15, and the strength for Supplier 4 in rows 16–20. Label this column **strength**. Then, in a different column (labeled **supplier**), enter **1** in rows 1–5, enter **2** in rows 6–10, enter **3** in rows 11–15, and enter **4** in rows 16–20. Select **Analyze ➔ Nonparametric Tests ➔ K Independent Samples**.
2. In the Tests for Several Independent Samples dialog box (see Figure A12.18), enter **strength** in the Test Variable List: edit box and **supplier** in the Grouping Variable: edit box. Select the Kruskal-Wallis H check box. Select the **Define Range** button.

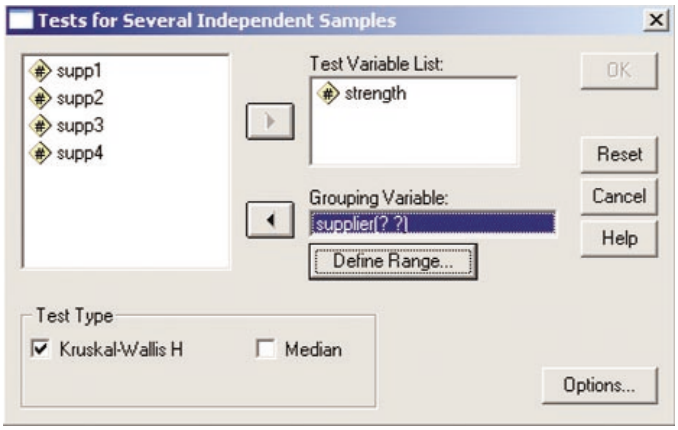

FIGURE A12.18 SPSS Tests for Several Independent Samples Dialog Box

3. In the Several Independent Samples: Define Range dialog box (see Figure A12.19), enter **1** in the Minimum: edit box and **4** in the Maximum: edit box. Click the **Continue** button to return to the Tests for Several Independent Samples dialog box. Click the **OK** button.

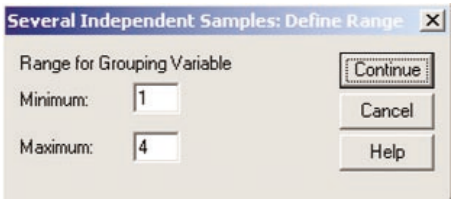

FIGURE A12.19 SPSS Tests for Several Independent Samples: Define Range Dialog Box

Figure A12.20 illustrates SPSS Kruskal-Wallis output for the parachute data.

Kruskal-Wallis Test

Ranks

	supplier	N	Mean Rank
strength	1.00	5	5.40
	2.00	5	15.30
	3.00	5	12.40
	4.00	5	8.90
	Total	20	

Test Statistics[a,b]

	strength
Chi-Square	7.900
df	3
Asymp. Sig.	.048

a. Kruskal Wallis Test

b. Grouping Variable: supplier

FIGURE A12.20 SPSS Kruskal-Wallis Output for the Parachute Data

Using SPSS for the Friedman Test

To use SPSS for the Friedman test, open the **FFCHAIN.SAV** file. Note that the data in columns 4–7 are organized as in Table 11.7 on page 415 with the ratings for each rater in a particular row and the ratings for each restaurant in one of four columns labeled rest1, rest2, rest3, and rest4. Select **Analyze ➔ Nonparametric Tests ➔ K Related Samples**. In the Tests for Several Related Samples dialog box (see Figure A12.21), enter **rest1, rest2, rest3**, and **rest4** in the Test Variables: edit box. Select the **Friedman** check box. Click the **OK** button. Figure A12.22 illustrates SPSS output of the Friedman test for the fast-food-chain data.

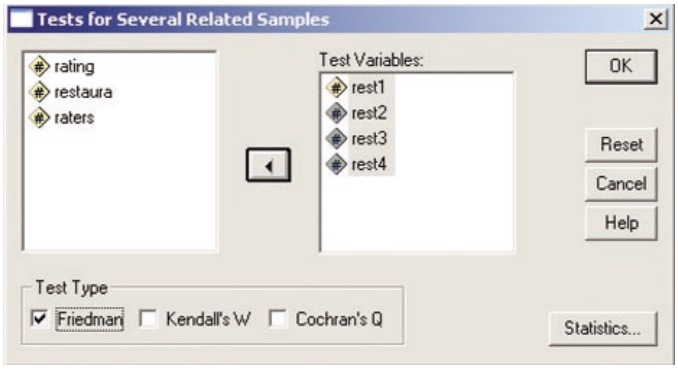

FIGURE A12.21 SPSS Tests for Several Related Samples Dialog Box

Friedman Test

Ranks

	Mean Rank
rest1	2.42
rest2	1.00
rest3	4.00
rest4	2.58

Test Statistics[a]

N	6
Chi-Square	16.525
df	3
Asymp. Sig.	.001

a. Friedman Test

FIGURE A12.22 SPSS Output of the Friedman Test for the Fast-Food-Chain Data