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Using ODA to Ascertain if Stratification Yields Different Transition Matrices

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When a first-order Markov model cannot be confirmed one approach is subdividing the sample into strata each having a distinct set of transition probabilities. This note demonstrates the use of ODA to assess whether stratification resulted in significantly different transition matrices.

Data for exposition (Table 1) were drawn from a study of social class identification, and used to illustrate Goodman's chi-square procedure for testing the hypothesis that sample stratification created dissimilar transition matrices.[1]

Table 1: Turnover Data[1] Used to Evaluate Stratified Transition Matrix Dissimilarity

Better Financial Change in 1958

	Middle	Working
Middle (1956)	93	23
Working (1956)	26	95

Worse Financial Change in 1958

	Middle	Working
Middle (1956)	28	22
Working (1956)	7	66

As described by Markus[1] "Comparing the two Middle Class rows, chi-square (df=1)= 10.33 (p<0.01); and for the two Working Class rows, chi-square (df=1)=14.90 (p<0.01). Thus, the stratification of the sample by perceived financial change has resulted in significantly different transition matrices" (p. 16).

ODA offers an exact nonparametric analogue to Goodman's test in this application.[2-7] As in Goodman's method, two ODA analyses are used, but individual ODA results are considered separately (ESS values aren't summed). In both analyses Class (Middle *vs*. Working) is the two-category class variable and perceived financial change is treated as a categorical attribute (this is consistent with chi-square analysis, and treating the attribute as ordered didn't alter the findings). Results are summarized in Table 2.

Table 2: ODA Stratification Effect Tests

	Model Sensitivity			
Class	Middle	Working	ESS	p<
Middle	80.2	44.0	24.2	0.0018
Working	21.5	90.4	11.9	0.045

As seen, ODA revealed relatively weak (defined[2] as ESS<25) statistically significant

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discrimination between stratified transition matrices, thus offering moderate support for the hypothesis that stratification by perceived financial change yielded significantly different transition matrices.

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