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PITFALLS IN THE APPLICATION OF DISCRIMINANT ANALYSIS IN BUSINESS, FINANCE, AND ECONOMICS

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I. INTRODUCTION

OF THE APPLIED DISCRIMINANT analysis papers that have appeared in the business, finance, and economics literature to date, most have suffered from methodological or statistical problems that have limited the practical usefulness of their results. While it is not true that the statistical problems are unique to economics or finance, it does seem that the nature of the subject matter and data are such that one can expect to encounter statistical difficulties more frequently than in many other application areas. The problems are of several different types, among which are difficulties with (1) the distributions of the variables, (2) the group dispersions, (3) the interpretation of the significance of individual variables, (4) the reduction of dimensionality, (5) the definitions of the groups, (6) the choice of the appropriate *a priori* probabilities and/or costs of misclassification, and (7) the estimation of classification error rates. The purpose of this paper is to discuss these problems of application of discriminant analysis techniques. Ample references are made to the literature for examples to illustrate the pitfalls. Finally, a brief discussion of future problems and prospects for statistical research on the application of the techniques is provided.

II. THE DISTRIBUTION OF THE VARIABLES

The standard discriminant analysis procedures assume that the variables used to describe or characterize the members of the groups being investigated are multivariate normally distributed. In practice, deviations from the normality assumption, at least in economics and finance, appear more likely to be the rule rather than the exception. Violations of the normality assumptions may bias the tests of significance and estimated error rates. Hence, it is of interest to determine whether the assumption holds and what effects its relaxation may have on the tests and on the classification. In the applied literature, the problem of testing for the appropriateness of the distributional assumption has been largely ignored. This is due in part, one would presume, to the fact that most available normality tests are for univariate and not multivariate normality.[1] Malkovich and Afifi (1973) discuss

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