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Review of choice-based, matched, and other stratified sample studies in auditing research

Iris Stuart ^{a,*}, Yong-Chul Shin ^b, Donald P. Cram ^c, Vijay Karan ^d

^a Norwegian School of Economics NHH, Norway

^b University of Massachusetts Boston, United States

^c State University of New York at Oswego, United States

^d California State University, Fullerton, United States

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ABSTRACT

The use of choice-based, matched, and other stratified sample designs is common in auditing research. However, it is not widely appreciated that the data analysis for these studies has to take into account the non-random nature of sample selection in these designs. A choice-based, matched or otherwise stratified sample is a *nonrandom* sample that must be analyzed using *conditional* analysis techniques. We review five research streams in the auditing area. These streams include work on determinants of audit litigation, audit fees, auditor reporting in financially distressed firms, audit quality and auditor switches. Cram, Karan, and Stuart (CKS) (2009) demonstrated the accuracy of conditional analysis, compared to unconditional analysis, of nonrandom samples through the use of simulations, replications, and mathematical proofs. Papers since published have continued to rely upon questionable research, however, and it is hard for researchers to identify what is the reliability of a given work. We complement and extend CKS (2009) by identifying audit papers in selected research streams whose results will likely differ if the data gathered are analyzed using conditional analysis techniques. Thus research can be advanced either by replication and reanalysis, or by refocus of new research upon issues that should no longer be viewed as settled.

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* Corresponding author.

E-mail address: Iris.Stuart@nhh.no (I. Stuart).

1. Introduction

Audit researchers have used choice-based, matched, and other stratified sample research designs frequently in research studies. They do so primarily for their power to reveal statistically significant findings following collection of relatively small data sets. Choice based and matched samples are frequently used to economize when data collection is costly, especially when outcomes of one sort are rare and few would be obtained under random selection. The research design of these non-random samples provides for efficient collection of fewer data points. For example, all firms experiencing auditor litigation during a period may be identified and compared to a control sample of matched firms (e.g., matching to each litigation firm by industry and firm size) rather than gathering data for all non-litigation firms. This is appropriate if a factor such as industry or firm size is likely to have a large effect on the likelihood of auditor litigation but not itself be of primary research interest. In such a case, the use of a matched sample design allows the researcher to focus power on estimating parameters for variables of interest while applying control for those “nuisance” variables. Or, if nuisance variables are likely to have a nonlinear effect, it suffices to match on those variables without modeling and estimating their effects explicitly. These justifications for use of non-random samples, stratified by choice and/or matching sets, have been explored by Cram, Karan, and Stuart (CKS) (2009). These types of studies, plus some additional studies in auditing which use stratified samples, require analyses taking the stratifications into account, which has often not been done.

Specifically, CKS (2009) identify six distinct research design categories of studies using choice-based and matching techniques in accounting research. They identify three general errors which can apply to analysis of choice-based and matched samples. This paper complements and extends that work by providing specific details on the use of choice-based and matched sample designs in five research streams within published auditing research from 1980 to 2003. This paper also adds a discussion of auditing papers in an additional nonrandom research design category—a stratified sample—whose analysis can suffer one of the same possible errors. Because current research often builds on prior research, the contribution of this paper will allow new researchers to identify past research whose results may change if analyzed using conditional techniques.

CKS (2009) replications show that the use of conditional techniques sometimes: reverses a research conclusion, identifies variables as significant that are not significant, identifies a factor as having a positive (negative) influence when it has a negative (positive) influence on the dependent variable, and renders significant variables insignificant. Given that new auditing research projects draw on the results from past research to motivate new research questions, this paper contributes to the literature by drawing attention to potential problems that might be present in these past research streams.

CKS (2009) provided summary reporting on their analysis of 83 studies using choice-based or matched samples in auditing research during 1980–2003. We focus upon works in just five research streams that illustrate the problems and include the main areas of concern for auditing research. We tabulate 70 papers from the time period reviewed and discuss the potential errors of model specification therein, plus discuss selected recent studies, in the context of research streams. For each tabulated paper, we provide summary information and state which of the three errors in CKS (2009) apply, and for many we provide specific discussion of what would be the preferred analysis. Thus we provide numerous examples that should be helpful for researchers seeking to extend research in these fields. We suggest how these studies might be re-examined, and provide guidance on how and when to apply the conditional analysis in each of seven distinct research designs.

Auditing researchers often reason persuasively that industry or size or other factors have large effects that must be controlled for, use those factors in selecting their sample, but continue to perform analysis that does not account for the matching. Matching on an effect does not accomplish the desired control if an unmatched method is then used to analyze the sample. Therefore, the researchers have created a strong possibility that their discussion of the relative importance of other factors of research interest is not justified. Briefly, their analyses are limited by the omission of multiple correlated variables, which leads to an unpredictable bias in the estimated coefficients and standard errors. This paper shows the effect of this bias in five audit research streams.

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