A New Combined Compensating Method for Wave Nonresponse in Panel Survey

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1. Introduction

Missing data problem occurs frequently in survey. Missing data are considered of two types; unit nonresponse and item nonresponse. In addition, another type of nonresponse, named wave nonresponse, occurs in panel survey. Wave nonresponse happens when one or more waves of panel data are missing for a unit that has provided data for at least one wave. Both weighting adjustment and imputation may be used to compensate for missing data due to wave nonresponse.

Lepkowski (1989) examined missing data compensation strategies for wave nonresponse. Weighting adjustment method is easier to implement and preserves the relationship in the observed data. However, it may give poorer quality nonresponse compensation than imputation. Furthermore, it requires numerous different sets of weights to execute longitudinal analysis. Imputation method is easy to use and simple to meet all analytic objectives. However, it reduces the ability to detect important relationships among survey variables through attenuation of the strength of observed covariances.

The objective of this study is to suggest a new compensation method for wave nonresponse, which combines weighting adjustment and imputation. We will use weighting adjustment only for nonresponses at wave 1. From wave 2, we will employ imputation methods.

2. New Method

Lepkowski (1989) introduced a few combining methods such as the imputation for completing attribution nonresponse approach and the imputation for completing wave nonresponse approach. Even though the rate of the non-attrition pattern in panel survey is very low in general, compensating nonresponse of that pattern often causes many complicated problems.

The main idea of new method is to get a simple and convenient method by discarding data from some of the non-attrition pattern. From now on, we restrict our concern to three wave case only. However, it can be extended to more general case as well. We use data of such patterns, xxx, xxo, xoo, xox only and discard data of the other patterns, oxx, oxo, oox, ooo, where o and x represent nonresponse and response respectively. The possibilitity of being nonresponse of a unit which is missing at wave 1 in subsequent waves is much higher than that of a unit which is not missing at

wave 1. So we sacrifice data of such patterns, oxx, oxo, oox, ooo to get simplicity and practicability. While the loss due to discarding some data is only a little, the gain due to convenience and simplicity is much more.

At wave 1, we use only weighting adjustment method for nonresponse. In other words, no imputation is taken to fill in missing data. The initial weights for survey units are replaced with the adjusted ones. At wave 2, nonresponse is replaced with imputed value. At wave 3, it is similar as at wave 2 for xxo type. However, for xoo type, another imputation, which is independent of the imputation used at wave 2, is taken. In this case, the same unit may take imputed values from different doners as wave changes.

3. Comments

We derived estimator of mean for cross-sectional analysis. Further we derived estimator of mean change between different waves. While several sets of weights are needed to serve longitudinal comparisons in weight adjustment method, our new method requires only one set of weights. Many complicated considerations are needed to use imputation methods for wave nonresponse. However our new method is somewhat simple and convenient to use.

Some numerical simulation results show that loss of information caused by using our new method is not so significant. On the other hand, the performance of our estimator seems to be quite reasonable.

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RESUME

L'Objective de cett etude est de suggerer une novelle methode de compensation qui unie l'adaptation d'alourdissement et l'imputation pour les vagues non-reponses dans le sondage de panneau.