

**SELECTING THE AMOUNT OF SMOOTHING IN
NONPARAMETRIC REGRESSION ESTIMATION FOR COMPLEX
SURVEYS**

by

J.D. Opsomer and C.P. Miller
Iowa State University

July 2, 2004

ABSTRACT

Model-assisted estimation is a common technique to improve the precision of finite population survey estimators by taking advantage of relationships between the survey variables and available auxiliary information. Breidt and Opsomer (2000) introduced a nonparametric model-assisted estimator based on local polynomial regression, which allows these relationships to be modelled nonparametrically. In this article, we address the issue of how to select the amount of smoothing for the nonparametric regression component of the model-assisted estimator. The proposed smoothing parameter selection method is based on minimizing a type of cross-validation criterion, suitably adjusted for the effect of the finite population setting and the survey design. Asymptotic properties of the method are derived, and simulation experiments show that it works well in practical settings as well.