# Using Social Network Information for Survey Estimation

Model-based and model-assisted methods of survey estimation aim to improve the precision of estimators of the population total or mean relative to methods based on the nonparametric Horvitz-Thompson estimator. These methods often use a linear regression model defined in terms of auxiliary variables whose values are assumed known for all population units.Information on networks represents another form of auxiliary information that might increase the precision of these estimators, particularly if it is reasonable to assume that networked population units have similar values of the survey variable. Linear models that use networksas a source of auxiliary information include autocorrelation, disturbance, and contextual models. In this article we focus on social networks, and investigate how much of the population structure of the network needs to be known for estimation methods based on these models to be useful. In particular, we use simulation to compare the performance of the bestlinear unbiased predictor under a model that ignores the network with model-based estimators that incorporate network information. Our results show that incorporating network information via a contextual model seems to be the most appropriate approach. We also show that one does not need to know the full population network, but that knowledge of the partial network linking the sampled population units to the non-sampled population units is necessary. Finally, we also provide an estimator for the mean-squared error to make an informed decision about using the contextual information, as well as the results showing that this adaptive strategy leads to higher precision.