Weighting in high-frequency phone survey*

One shortcoming of the COVID-19 HFPS is its lack of national representativeness in key statistics. People who respond to phone interviews may have systematically different characteristics as compared to people who do not respond to phone interviews. Many poor households or those living in rural areas do not have a phone, while most rich households or those in urban areas do. Since phone ownership is essential for phone interviews, an unbalanced distribution of phone ownership makes the collection of nationally representative data challenging because responses are often not uniform.

To address these sampling limitations of a phone survey, we adjust sampling weights so that weighted averages of key statistics become nationally representative. The reweighting process has two major steps: (i) Propensity Score Weighting and (ii) Maxentropy or raking.

Propensity Score Weighting (PSW) is designed to adjust a phone survey's sampling weights by comparing a nationally representative household survey, called a reference survey, with a phone survey. PSW appends the phone survey to the reference and estimates each household's probability of being included in the phone survey. PSW then ranks all households in the phone survey data based on the predicted probability and creates quintiles. The weights of households in the phone survey are adjusted so that each quintile's share of households in the phone survey exactly resembles that of the reference survey. More specifically, the weights of households in the phone survey are adjusted so that the sum of their weights in each quintile becomes identical to that of households in the reference survey.

To refine the weights further, we execute maxentropy. Even after PSW, summary statistics in the phone survey could differ largely from those in the reference survey. Such differences can be real, particularly when a long time has passed between the reference and phone surveys. Still, it is unlikely that summary statistics of time-invariant (slowly changing) indicators like household size, dependency ratios, household head's education attainment, or population shares of districts would change significantly. Maxentropy adjusts weights to match the summary statistics of these time-invariant variables between the reference and phone survey in an exact manner. The following box briefly explains how maxentropy works.

Box 1. Maxentropy

Maxentropy is a Stata command that selects weights that maximize entropy while matching averages of pre-selected indicators between the reference and phone surveys. The selection of indicators is important. The indicators need to be time-invariant (slowly changing). Otherwise, since there is some time between the reference and phone surveys, the averages of indicators can change. Ignoring the real changes and forcing the averages between the two surveys to be the same can bias all statistics estimated from the phone survey. Therefore, it is important to select indicators that are time-invariant (slowly changing).[1] Indicators like household size, dependency ratio, highest educational attainment of the household head, and population shares of subnational units are such examples. However, since these indicators can also change over time and the speed of the change varies by country, it is always useful to look at trends of these indicators using multiple rounds of past comparable household before selecting the indicators for matching.

* this note is a short summary of weighting techniques used for the Myanmar COVID-19 Monitoring Household Phone survey.

[1] This identification of time invariant variables is also important when running SWIFT Plus.