Using Partially Synthetic Frames to Evaluate Alternative Sample Designs for Estimating a Rare Business Characteristic

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In the "traditional'" finite population sampling framework, the sample designer has a complete list (frame) of eligible units with classification information and auxiliary variables related to surveyed characteristics. In our setting, the frame auxiliary variables are *weakly* related to the survey characteristic, which is not present for most units. Hence, using frame auxiliary variables to assess survey design efficacy can be misleading. Instead, we propose generating multiple partially synthetic frames, modeling characteristic values for each unit on the frame, then drawing repeated samples from each synthetic frame using the candidate sample design(s) to assess finite sample performance for each design within and between the synthetic frames. Focusing on establishment survey data, we illustrate our proposed approach on a subset of industries surveyed annually by the Business Enterprise Research and Development Survey.

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