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Accounting for Uncertainty in the Evaluation of Data Collection Costs and Data Quality under Partitioned Designs for the U.S. Consumer Expenditure Surveys

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Abstract

In the evaluation of prospective survey designs, statistical agencies generally must consider a large number of design factors that may have a substantial impact on both survey costs and data quality. Assessments of trade-offs between cost and quality are often complicated by limitations on the amount of information available regarding fixed and marginal costs related to: instrument redesign and field testing; the number of primary sample units and sample elements included in the sample; assignment of instrument sections and collection modes to specific sample elements; and (for longitudinal surveys) the number and periodicity of interviews. Similarly, designers often have limited information on the impact of these design factors on data quality.

This paper extends standard design-optimization approaches to account for uncertainty in the abovementioned components of cost and quality. Special attention is directed toward the level of precision required for cost and quality information to provide useful input into the design process; sensitivity of cost-quality trade-offs to changes in assumptions regarding functional forms; and implications for preliminary work focused on collection of cost and quality information. In addition, the paper considers distinctions between cost and quality components encountered in field testing and production work, respectively; incorporation of production-level cost and quality information into adaptive design work; as well as costs and operational risks arising from the collection of detailed cost and quality data during production work. The proposed methods are motivated by, and applied to, work with partitioned redesign of the interview and diary components of the U.S. Consumer Expenditure Survey.

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