

DISCUSSION

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Frame and Sample Design Issues for Business Surveys

First of all, let me thank the various speakers and their coauthors for their papers. I found all of the papers to be well-written and informative. It is somewhat difficult to provide detailed comments on five fairly lengthy, technical papers in the span of 15 minutes. So let me bring together some common thoughts on the papers.

The five papers are from two well-respected statistical agencies, and they are authored by persons with extensive business survey experience. The papers all address methods for maintaining or

improving various cost or quality issues associated with business surveys of the respective agencies.

To draw on some general remarks, however, it might be useful to partition the papers into one of two categories. Those papers dealing primarily with topics usually associated with sample design and the control of sampling error would be one category. The other category would be those papers dealing with controlling nonsampling error, such as coverage error, nonresponse error, frame maintenance problems, and the like.

A rough classification of these papers could be as follows:

Paper	Topics Covered	
	Sampling Error	Nonsampling Error
Data Quality Concerns With Subannual Business Frames		Coverage issues Data quality Frame maintenance
Reassessment Of The Use Of An Area Sample For The Monthly Retail Trade Survey		Coverage issues Frame maintenance
Sample Design For The Monthly Retail Trade Survey	Sample design Stratification Allocation Estimation Variance estimation	
Problems Associated With Designing Subannual Business Surveys	Sample design Stratification Allocation Estimation Sample rotation	Frame maintenance Editing Imputation
Two-phase Sampling Of Tax Records For Business Surveys	Sample design Estimation Variance estimation Allocation	

According to this fairly rough partitioning of the papers, we have two papers addressing what would be broadly termed sample design issues, two papers on issues involving sources of nonsampling error, and one paper addressing parts of both.

I found it interesting, but not surprising, that the two papers dealing primarily with sample design issues are relatively straightforward in tone and have a reasonably high level of confidence associated with the writing style. I found this not surprising since each of these papers had the support of well-developed mathematical and statistical reasoning to confirm the author's direction.

On the other hand, the tone of the three papers addressing sources of nonsampling error was not nearly as universally confident, in general. In fact, the titles of these papers include words such as "data quality concerns," "reassessment"

and "problems."

And it is not just the titles, but the concluding sections of the papers on nonsampling error have phrases such as: "more study needs to be done," "more work and research are required," and "maintaining a current and correct list of businesses for purposes of sampling is a difficult operation."

The common thought that I am trying to pull together here is the following: The control of sampling error is a science that has been around for quite some time now, and its techniques, while still being honed, are fairly well-established. Controlling nonsampling error, especially in business or economic surveys, is not nearly as fully developed as a science. The authors of these papers are well-experienced survey statisticians and are fully aware of this. I am not trying to be condescending here.

Fortunately or unfortunately, however, the biggest area for improving overall survey quality in business surveys lies in the area of controlling, reducing, or eliminating the various sources of nonsampling error which affect those surveys. I think modern notions of quality improvement applied to business surveys would see nonsampling error as the area where quality improvement would be most fruitful. Further reductions in sampling error through enhanced methods, while useful, are not going to give anywhere near the gain to quality improvement as will productive work on reducing nonsampling errors.

Experienced survey statisticians know this. They are aware of how difficult it is to control, reduce, or eliminate the various sources of nonsampling error. Unlike the vast literature available on statistical methods to control and reduce sampling error, no such large body of research exists on methods to reduce nonsampling error in business surveys. The authors are correct; more research is needed in the area of nonsampling errors in business surveys.

With this general overview, let me now give some specific comments on each of the papers.

The papers from the U.S. Bureau of the Census address the Census Bureau's Monthly Retail Trade Survey, although the area sample addressed in the Konschnik, King, and Dahl paper is also used in the Bureau's Services Annual Survey, and the sample design methodology described in the Detlefsen and Veum paper is also applied to the Bureau's sample survey program on selected services, as well as wholesale trade.

The Detlefsen/Veum paper describes the sample design used in the most recent process of revising the sample for the retail program. This quinquennial sample revision process addresses only the list sample revision, while the Konschnik, King, Dahl paper addresses the area sample component. The Detlefsen/Veum paper updates a series of prior papers on the revision process with the new wrinkle of trying to use the LaVallee-Hidirogrou stratification scheme adapted to optimal allocation. Putting this in context with my opening remarks, this work attempted to squeeze a little bit more sampling error out of the process, and, while useful, the payoff in quality gains is probably not significant compared to the cum \sqrt{f} rule that was actually applied for stratum construction. Since stratification does not cost in this situation, one could always create more strata if precision gains are desired. But prior research shows that most gains in this survey occur after 6 or 9 strata have been constructed.

The Konschnik, King, Dahl paper addresses the area sample component of the Monthly Retail Trade Survey. The area sample covers nonemployers and "birth" employers not yet subjected to list sampling methods. The area sample has the admirable trait of supplementing coverage for the list sample, but it is expensive (\$1 million dollars to cover 5-6% of the retail universe) and it has high sampling error. So I think a solid search for alternatives is warranted, even though the area sample serves the valuable purpose of supplementing coverage as well as providing insurance against problems involved in maintaining the list frame. The proposals that the authors

make seem reasonable to pursue in a research mode. A proposal that I somewhat hesitantly put forth is to measure the entire universe well once a year and let the Bureau's benchmarking process carry forward the effects on levels to monthly estimates measured without the area sample at all. That is, no monthly measurement of nonemployers or "birth" employers. I make this suggestion based on Attachment 4 of the paper which shows little difference in month-to-month trend when one excludes area sample data. I would like to see that table extended for one full business cycle, say, back to 1980, to see if economic upswings or downswings affect the results of this analysis done only for the year 1990. Again, harking back to my earlier comments on nonsampling errors, more research is needed here, including research on my own suggestion.

The three papers by Statistics Canada were all well-written and informative. The Armstrong, Block, Srinath paper described the two-phase sample design procedure adopted by Statistics Canada for the sampling of tax records. I found this paper to provide excellent documentation of the sample design, including the development of the optimal sampling fractions to be deployed.

The paper by Hidirogrou and Srinath covered many aspects of subannual business surveys, including the frame maintenance problems and the handling of business births and deaths. The authors point out in their paper that one of the reasons that methodological problems associated with designing continuous subannual surveys for businesses tend to be more complex is that the universe to be sampled from is extremely skewed. I agree with that observation, and it affects not only the controlling of sampling error, but also the controlling of nonsampling error.

Finally, the paper by Laniel and Finlay lists many data quality concerns in business surveys, but concentrates primarily on what I would term frame issues. Problems associated with constructing an initial frame for initial sample selection purposes, or problems associated with maintaining the frame and sample through time, receive much attention in the paper. The authors give names to all the various problems and give some methodological solutions. But again in the conclusion, they indicated that more research is needed. Frame problems are very serious problems, and I urge the authors to continue their research efforts in this area because I think it would be time well-spent.

Let me close by thanking all of the authors for the well-written, informative papers. I enjoyed reading the papers and being the discussant for this session.