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SURVEY RESEARCH IN THE NEXT DECADE: PROSPECTS AND CHALLENGES

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ABSTRACT

Survey research developed in a major way in the second half of the last century, in terms of numbers of surveys, range of subjects accepted as amenable to study, and in methodology. The increase in the use of survey data for policy making and empirical research continues unabated. Also analysts are placing heavier demands on the data to support the deeper analyses they are now conducting. The next decade is likely to see further significant developments, particularly in international surveys, panel surveys, small area estimation, observational studies, secondary analyses, and modes of data collection. The major concern is that the public's cooperation in surveys will decline and nonresponse rates will rise. The advanced methods now being used in survey research have led to specialization in the different disciplines involved in the survey process. The need for an international professional society that unites these disciplines is discussed. Some ideas for a continuing education program in survey statistics are presented.

KEYWORDS: Continuing Education; International Surveys; Modes of Data Collection; Nonresponse; Panel Surveys; Professional Society; Secondary Analyses; Small Area Estimation.

1. INTRODUCTION

The ambitious aim of this paper is to identify major developments that are likely to occur in survey research in the next decade. Some of these developments will be advances in methodology, some will be expansions in the occurrence of certain types of surveys, and others will be the consequences of external changes in technology and society. It is, of course, dangerous to attempt to forecast such developments. As Nils Bohr observed "Prediction is very difficult, especially if it is about the future." Nevertheless, I will attempt such predictions. In meteorological terms, my forecast is "Sunny, but there is a threatening black cloud on the horizon."

The structure of the paper is as follows. The next section reviews some of the major changes that have occurred in the past quarter century, with the aim of giving a historical perspective and identifying trends that might be ongoing. Section 3 makes predictions for the next decade in terms of the types of survey and of survey estimates that are likely to be increasingly in demand, the methodological challenges that these surveys present, and likely developments in the area of data collection. Section 4 considers the future of the survey research profession, its organizational structure, and training needs for survey statisticians. Section 5 contains some concluding remarks.

2. PAST DEVELOPMENTS

In a previous paper (Kalton, 2000) I reviewed developments in survey research in the last quarter of the 20th century. Computers feature prominently in these developments because of their major impact on many aspects of survey methodology. Computers were introduced and are now widely accepted in data collection with computer assisted personal interviewing (CAPI), computer assisted telephone interviewing (CATI), computer assisted self

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interviewing (CASI), and audio-CASI for the collection of sensitive data. Software packages to handle these applications were developed, with the simple early versions being upgraded in major ways over this time period. All statistical activities capitalized on the increased computational power to develop and apply more powerful methods. Thus increased computing power stimulated the development of more advanced methods of weighting adjustments for nonresponse and for benchmarking, and also the use of imputation and the development of more sophisticated methods of imputation. The increased computing power, together with the creation of appropriate software, led to the fairly routine computation of sampling errors for both simple and complex statistics from complex sample designs, including the use of computer-intensive replication methods for this purpose. There was also a major expansion in the use of more complex analytic methods (multiple linear regression, logistic regression, categorical data analysis, and multi-level modeling) with survey data.

The increased ease of performing survey analysis has led analysts to expand their horizons. One result of this expansion has been a pressure to broaden the scope of the survey data base, partly by adding items to the survey questionnaire and partly through linkages to administrative data. The interests of analysts in dynamic as well as static analyses led to a rapid expansion in the use of panel surveys in the last quarter century. Another result of the expansion has been to stimulate demand for estimates for small domains, particularly for small geographical areas. In general, a survey's sample size is inadequate to produce standard design-based small area estimates of adequate precision. To address this limitation, considerable research efforts have been devoted to the development of model-dependent small area estimation methods. The use of these methods has become more widely accepted in recent years. A third result of the expansion has been the increased recognition that survey data sets often provide the data needed for a range of analyses that are not the primary focus of the survey. Secondary analysis of survey data has increased greatly and ways to facilitate the use of survey data by secondary analysts have been developed.

Another area of increased methodological attention during the past quarter century was that of nonsampling errors, with the concepts of total survey error and total survey design receiving greater prominence. A welcome development was the renewed interest in questionnaire design, stimulated by the cognitive aspects of survey methodology (CASM) movement.

Associated with advances in survey analysis, greater use of linkages to administrative data, and the demand for access to data sets for secondary analyses, the concern to protect the privacy and confidentiality of survey respondents has greatly intensified. This concern has led to the development of methods for disclosure limitation for public use data files and of secure sites for analyses of non-public use data files by authorized analysts.

All the developments above have been advances in survey research. The one negative development has been a reduction in the willingness of the public to participate in surveys. This reduction has been partially counteracted by greater efforts to secure cooperation, but even with these greater efforts, response rates have fallen, at least in the United States. This is my "black cloud". As indicated below, I see nonreponse as possibly developing into a very serious concern for survey research.

Finally, a significant development in the past quarter century has been the clear emergence of the discipline of survey research (Kalton, 2000). During this period, the establishment of *Survey Methodology* and the *Journal of Official Statistics* has provided valuable outlets for papers in survey methodology, whereas before the appearance of these journals such papers were widely scattered in many different places. Several professional associations for survey methodologists were founded in this period, which also saw the emergence of many conferences and symposia, both national and international, focused on survey methodology. I return to the subject of the survey research profession in Section 5.

3. THE NEXT DECADE

In this section I make predictions for survey research for the next decade. Many of the predictions are simply projections of recent trends. Some are more accurately described as prime areas in which I hope to see methodological advances in the coming years rather than predictions of what will in fact occur.

International and Cross-National Surveys. Interest in conducting essentially the same survey in a number of different countries has existed for many years. The World Fertility Survey (WFS), started in 1972 with funding from the United Nations, is an early example of a major international survey program. Besides providing comparable data on fertility behavior for many developing countries, the WFS made an extremely valuable and enduring contribution to capacity building in survey taking in those countries. The ongoing Demographic and Health Surveys (DHS), funded by USAID, can be viewed as a continuation of the WFS. Various UN agencies sponsor surveys on other topics, for instance, UNICEF's Multiple Indicator Cluster Survey (MICS) and WHO's recently mounted World Health Surveys (WHS). The World Bank sponsors the Living Standards Measurement Study (LSMS). In the area of education, OECD sponsors the Programme for International Student Assessment (PISA), the International Association for the Evaluation of Education Achievement sponsors the Trends in International Mathematics and Science Study (TIMSS), and a number of countries have participated in the International Adult Literacy Survey (IALS). Since the 1980's survey organizations in an increasing number of countries have collaborated in conducting the annual International Social Survey Programme (ISSP). The European Social Survey (ESS) has recently been launched in a number of European countries. Eurostat has established standardized labor force surveys (LFS), household budget surveys (HBS), and surveys on Statistics on Income and Living Conditions—community household panel surveys—for EU member countries.

This incomplete list of examples illustrates the range of auspices under which international and cross-national surveys are conducted, including international agencies, collaborations of national statistical agencies, and collaborations of non-government social researchers. In addition to replication of full surveys across countries, the establishment and measurement of standardized concepts in surveys across countries should be noted. A good example is the North American Industry Classification System (NAICS) that has been created to provide comparability in statistics about business activity in Canada, Mexico, and the United States.

International and cross-national surveys are already clearly well-established and I forecast substantial further growth in this area. These surveys present many serious methodological problems that I think have not yet had the attention they deserve. To obtain comparable results for different countries requires careful attention to all aspects of survey methodology. Issues of comparability in translation when different languages are involved and of the comparability of underlying concepts across countries are well-recognized as presenting significant challenges.[2] Less well-recognized is the need to consider other aspects of methodology, such as survey coverage, sampling, interviewer training and quality, unit and item response rates, editing and weighting. Uniform quality standards can be specified and enforced in international surveys with external funding. However, ensuring quality is more difficult in collaborative cross-national surveys. Resolving different traditions in survey taking in collaborating countries can pose thorny problems. I hope to see more attention to these issues in the future. A promising sign is the recent book by Harkness, Van de Vijver, and Mohler (2003) on cross-cultural survey methods. See also Verma (2002) on comparability of international survey statistics and Holt (2003) on the issues involved in constructing statistical indicators for international comparisons.

Panel Surveys. As indicated in the previous section, panel surveys became very popular in the past quarter century. Household panel surveys modeled on the University of Michigan's Panel Study of Income Dynamics (PSID) have been set up in many countries, and similar surveys such as the U.S. Survey of Income and Program Participation (SIPP) and the Canadian Survey of Labour and Income Dynamics (SLID) have also been established. Many panel surveys are conducted in the field of education, for instance, the U.S. Early Childhood Longitudinal Studies, the U.S. National Education Longitudinal Study of 1988, and the U.S. Baccalaureate and Beyond Longitudinal Study. Birth cohort studies have been conducted in many countries, including several in Britain, the first of which—the National Survey of Health and Development—started in 1946 and is still continuing. Planning for a major U.S. panel survey of environmental effects on health and development —the National Children's Study—is currently underway. The study aims to follow a sample of more than 100,000 children from before birth until age 21. The Canadian National Population Health Survey has been interviewing a sample of Canadians every two years since

[2] As an aside, it is less well-recognized that these issues also apply within many countries and will become more important with greater international mobility.

1994. Many other examples in a range of different subjects could be given. Panel surveys are well-established and indeed could be said to have become fashionable at this time.

Like other surveys, panel surveys generally focus on a single primary subject. However, the repeated interviewing in a panel survey provides the opportunity to collect data on a range of related subjects over the course of the panel. Topical modules are often added at different waves to collect additional data to the core data that are collected at each wave. There are two principal advantages: first, the analytic potential of the panel data is increased; and, second, the extra data can help to secure additional funding to support the high cost of a panel survey. However, the collection of extra data makes for added complexity and it may cause excessive respondent burden and unduly high attrition from the panel. Even without the extra data, panel surveys are complex and respondent burden is high. Great care should be taken to avoid the temptation to overload a panel survey with too many demands.

The prime strength of a panel design is the ability to analyze the relationships of variables measured at different time points, such as the gross change in a characteristic (e.g., health status) between one time point and the next. However, a serious problem with such analyses is that the results can be badly distorted by measurement errors. More research is needed on ways to handle measurement errors in such longitudinal analyses. In the past a common criticism of panel surveys was that few longitudinal analyses were conducted with the data that they produced. With the major advances in computing the situation has improved considerably, but it remains true that generally panel survey data could be profitably analyzed more fully longitudinally than is currently the case. Providing assistance with handling complex panel survey data files to secondary analysts and promoting the use of methods of longitudinal analysis would help to address the under-utilization of expensively collected panel survey data.

Small Area Estimation. Rao (2003) provides a comprehensive account of the major developments in statistical techniques for small area estimation that have occurred in recent years. With policy makers' interest in directing resources to the needy at the local level, I think that the demand for small area estimates will remain high in both developed and developing countries. For example, poverty mapping will remain an important concern for developing countries. In future developments I hope that more attention will be given to the compilation of uniformly measured auxiliary variables for the small areas to use as predictors in the modeling and also to thorough evaluation of the quality of the small area estimates produced from the models.

Observational Studies. Surveys are being widely used in studies designed to evaluate the effects of program interventions. The interventions may be global ones, such as an anti-drug television campaign, or interventions in a number of test sites, such as the introduction of special techniques to increase immunization levels in a few selected areas. Test sites may be chosen randomly or, more often, purposively. The studies may involve panel designs and control groups. I think that the use of survey methods in such observational—quasi-experimental—studies or experimental studies is likely to increase in the future. The analysis of these studies presents challenging problems that I think need more attention. Similar analytic issues arise with epidemiological case-control studies, where population controls are selected by survey sampling methods, often random digit dialing.

Secondary Analyses. I expect continual growth in the demand for survey data for secondary analyses. Currently the main vehicles for satisfying that demand are public use data files and secure sites. I foresee further research on data disclosure methods and on the impact of those methods on the survey estimates. There is likely to be a rapid growth in secondary analysts conducting their analyses online, with the analyses providing not only the required estimates but also the standard errors of those estimates computed in a way that takes the complex sample design into account. An example of this general approach is provided by the online data analysis system currently available for use with some surveys in the U.S. Inter-University Consortium for Political and Social Research's social science data archive.

Modes of Data Collection. Computers are now widely used in survey data collection and they are used in a variety of different ways (see, for example, Couper et al., 1998). Further technological developments in computing and in communications are likely to lead to changes in data collection methods in the next decade (Nathan, 2001). Thus, for example, computer audio recorded interviewing (CARI) has recently appeared. The developments in handheld tablet computers will prove particularly valuable for data collection in certain circumstances, such as for surveys of mobile populations and for doorstep interviews. Methods of automatic speech recognition will have a number of possible

applications when the methods are perfected, uses may be found for text messaging with cell phones, and touchtone data entry methods may become more popular.

Some changes will be harmful for survey research rather than present opportunities for improvements. The increased use of cell phones to replace landline phones is problematic in the United States at least, since a person receiving a cell phone call is charged for the call. Answering machines and caller ID are other causes for concern because of their possible negative effects on response rates. The ability to retain the same telephone number at a new location will likely cause problems for surveys of local areas since the telephone numbers for an area will not be confined to certain office codes. The effects of the introduction of the "do not call" list for marketers in the United States on cooperation in telephone surveys are not yet clear: they could be harmful or beneficial.

Web surveys and email surveys are the subject of great current interest and research, and their use will almost certainly increase substantially in the future in both business and population surveys. These methods provide possibilities for innovative forms of communication (e.g., pictorial displays) and for online editing that will undoubtedly continue to be the subjects of active research. For business surveys, a basic issue is how to persuade respondents to use these modes of response rather than paper-and-pencil questionnaires. The key may be to make the computer-based method easier for the respondent to handle, which may mean adapting the data collection to conform to the business's records. For household surveys, the basic issue is the limited penetration of home computers with internet connections. Some working in this field appear to be seduced by the ability of the new technology to generate large numbers of responses at low cost and in a very short time frame. They discount the unrepresentativeness of the samples so obtained. That error was made with the Literary Digest Poll in 1936. The lessons learned from that poll should not be ignored.

In my view, at least for a number of years, the role of internet data collection in household surveys should be as one mode among others in mixed mode surveys of probability samples of the total population. With this type of use, research needs to be conducted to determine how to incorporate the internet mode and to make sure that comparable data are collected by the alternative modes offered to respondents.

Other forms of data collection that I think will increase in the future move away from respondents' reports to observational data. Examples include the placement of instruments in households to record environmental pollution levels, the use of videotape recordings to document parent-child interactions, the collection of blood, hair, and urine samples for drug detection, the collection of observational data on the neighborhood of sampled households, and the use of global positioning systems (GPS) to determine the exact location of a sampled unit for linkages to other data.

Nonresponse. It seems clear that the general population is becoming increasingly less willing to cooperate in surveys. Greater efforts to secure cooperation, particularly by following up not-at-homes, have mitigated the effect on response rates, but nevertheless response rates have been declining (Groves and Couper, 1998). Concerns about falling response rates have led to a considerable amount of research into both methods to gain cooperation and methods to compensate for nonresponse in the analysis (see, for example, Groves et al., 2002). I fear that willingness to cooperate in surveys will continue to decline in the future.

In the United States response rates for household telephone surveys using random digit dialing (RDD) sampling have already fallen to a level that seriously threatens the quality of survey estimates. Further reductions could make this form of sampling unacceptable for many surveys. If so, other methods may be required to retain the cost benefits of telephone interviewing, particularly for surveys of rare populations. From a United Kingdom perspective, in view of the low telephone survey response rates, Collins and Sykes (2003) advocate jettisoning probability sampling in favor of access panels of persons willing to participate and collecting data from them in whichever mode they prefer. As Nathan (2003) notes in his discussion of the paper by Collins and Sykes, that prescription brings back the problems of the 1936 Literary Digest Poll.

The low response rates in household surveys in Germany are one of the considerations that have led the German Federal Statistical Office to examine the use of access panels selected from its Microcensus. The panels would comprise a sample of those indicating a willingness to participate in surveys (Körner and Nimmergut, 2003). One advantage of this approach is that Microcensus data are available for both those saying that they are willing and

those saying that they are unwilling to participate in surveys, and for respondents and nonrespondents in a particular survey. These data can be used in attempting to compensate for nonresponse and to assess nonresponse bias. Other types of access panels have also been used, such as internet panels where participating households are asked to respond to a series of surveys. If the sample for a survey based on an access panel is to be of high quality, the panel needs to be selected by scientific probability sampling methods from a frame with high coverage, and the incentives for participation need to be sufficient to obtain a high response rate for the initial panel recruitment and then a high response rate for that survey.

Other issues. I consider sampling methods to be well-established and I do not expect great developments in the coming decade. New sampling techniques may evolve in response to new data collection methodologies, but they are likely to be variants of existing techniques. Among advances that may be expected are the following: improved methods are needed and may be developed to deal with multivariate item nonresponse and variance estimation with imputed data sets; and variance estimation with complex sample designs may be made more straightforward by incorporating variance estimation into standard analysis packages.

Reduction in nonsampling errors, particularly response errors, remains the greatest need in survey research. Continued research on data collection methods and questionnaire design is much needed, including the research stimulated by the CASM movement (Sirken et al., 1999; Tourangeau, Rips, and Rasinski, 2000). Advances can be expected but major breakthroughs in this difficult area appear unlikely. The application of theories from various social sciences can aid our understanding of some problems. For example, the research on memory in psychology can help with understanding errors in answering recall questions, research in linguistics can help the understanding of question wording effects, and sociological theories of interpersonal interactions can help understanding of motivations to respond in surveys. It is an open question, however, as to whether these understandings can be converted into prescriptions for greatly improved survey methods.

The concept of total survey error was introduced a number of years ago to emphasize that there are trade-offs to be made between a number of sources of error in reaching the best survey design. This concept has become more prominent recently and is likely to remain so. Biemer and Lyberg (2003) discuss survey quality in terms of these sources of error, the trade-offs between them, and the survey processes that can be employed to control errors from the various sources.

A more general view of the quality of statistical data has recently been articulated in a number of statistical agencies. Brackstone (1999), for example, has identified the following dimensions of quality: relevance, accuracy, timeliness, accessibility, interpretability, and coherence (see also, Statistics Canada, 2003). This broad view of quality, with its recognition of the trade-offs often involved between the different dimensions, provides a valuable framework for planning and evaluation.

The timeliness dimension is an important one for many surveys. The need for timely results often leads to the publication of preliminary results, followed later by revisions, in business surveys. It might have been expected that the introduction of computers in all phases of survey operations would greatly speed up the whole process. To an extent it has done so, but the effect has been partially counterbalanced by the greater complexity of modern surveys, itself made possible by computers. There seems to be room for more to be done in terms of timeliness, with closer integration of the survey processes. I see this as a likely development in coming years.

4. THE SURVEY RESEARCH PROFESSION

Up to about a quarter of a century ago the body of knowledge about survey research methods was limited enough that a survey researcher could master all aspects of the subject reasonably well. The major developments that have taken place since then have led to the replacement of a generalist methodologist by a team of specialists for the conduct of a survey. The team needs to have representation of survey statisticians, survey methodologists, survey managers, and computing specialists. (Of course, any survey also requires input from specialists in the survey's

subject-matter.) The expansion of the body of knowledge and the resultant specialization have implications for the structure of the profession and for training that are briefly discussed in this section.

The profession. The origins of survey research lie in the many substantive disciplines that have used survey methods in their research. Sampling methods were of central importance, and hence statistical societies became a focal point. As the field of statistics developed, specialization occurred and special sections for survey research emerged in statistical societies (e.g., the International Association of Survey Statisticians (IASS) in the International Statistical Institute, the Section on Survey Research Methods (SRM) of the American Statistical Association, and the Social Statistics Section of the Royal Statistical Society). Although these sections have embraced all aspects of survey methodology, given their home societies they have naturally concentrated mostly on the statistical aspects of surveys. Other societies, such as the American Association for Public Opinion Research (AAPOR), have focused more on the non-statistical aspects of survey methodology and on survey management. The Association for Statistical Computing in the United Kingdom is concerned with the many uses of computers in survey research.

The various groups that deal with different aspects of survey methods are all vibrant and they make important contributions to the development of the field. However, the division of survey research into its different disciplines in this fashion is not ideal. Survey research involves the close collaboration of multidisciplinary teams and the exchange of ideas between the different disciplines is important. There are some welcome and highly valuable collaborations, such as between SRM, IASS, and AAPOR in running international conferences, but I suggest that a more formal structure for uniting survey researchers of all disciplines would be beneficial at this time, and perhaps increasingly so in the future. Moreover, I suggest that such a structure should be an international one in line with the way the field has developed. I should stress that this suggestion for an international survey research society is intended to be in addition to the existing societies. Researchers in each of the separate disciplines involved in survey research need to maintain close contacts with researchers working in other areas of their discipline in order to take advantage of advances in those other areas. One possible model for an international survey research society with considerable attractions is to create the society as an evolving formal collaboration of existing societies or sections from different disciplines in a number of countries.

Training. Each of the areas of survey research now has a large body of knowledge with which methodologists working in those areas should be familiar. Around the world there is a shortage of highly trained survey statisticians and survey methodologists, and there are limited training opportunities. Most universities are ill-equipped to teach survey research methods as a multidisciplinary subject based on a combination of theory and practice. However, there are promising signs of change, with the introduction of Masters programs at a few universities. I hope that more such programs may appear in the coming decade.

Although Masters programs in survey research are important, I am concerned that at least in the area of survey statistics they cannot be expected to teach in adequate detail all the methods that practicing survey statisticians need in their work. As I have discussed more fully elsewhere (Kalton, 2002), I believe that a Masters program in survey statistics should include courses in statistical theory and methods, survey sampling theory and practice, general survey research methods, computing, and communication skills. Ideally the program should equip its graduates with a sound knowledge of current methods and a basis for learning new methods that emerge during their working lives. The advanced methods now being widely used in survey statistics require a strong foundation in statistical theory and methods and a detailed coverage of many different topics in survey statistics. In my experience, these requirements cannot be adequately satisfied even with a very demanding Masters program. Students can be exposed to a wide range of topics in survey statistics, but not in the depth required for informed practical application.

One possible solution to this problem is to start survey research and statistics training earlier in the student's education, for example at the undergraduate level, perhaps as a joint degree. An alternative approach is to provide opportunities for further training after the completion of a Masters program. (I exclude here students who continue to a doctorate program.) In large organizations such as Statistics Canada and L'Institut National de la Statistique et des Études Économiques (INSEE) in France, continuing education courses can be—and are—conducted in-house, but that approach fails to cover most working survey statisticians. The short intensive half-day to two-day courses that are offered at professional meetings and by some universities are very valuable, but they generally serve only as good overviews of the topics covered. Participants rarely do the extra work needed to fully digest and understand

what they have had presented. I therefore see a need for formal continuing education programs for survey statisticians, with some form of accreditation by universities or a professional society. A program could, for example, consist of a set of courses on specific topics, with assigned readings, exercises, and some form of examination on which to base the award of a certificate for successful completion of each course. A course would be spread out over time, with its length chosen to reflect the content to be covered. Distance learning methods might be used to enable participation from any location. The following list illustrates the types of topics that could be included: nonresponse and calibration weighting adjustments; edit and imputation methods; design and estimation for surveys across time; measurement error models; small area estimation; sampling for establishment surveys; design and analysis of observational studies; and disclosure limitation techniques. Masters students may have some exposure to such topics during their degree programs, but it is unlikely to be enough to enable them to handle the topics in practice. Moreover, the recent rapid advancement in survey statistics is likely to continue in the future. Continuing education programs are needed to keep working survey statisticians informed about new developments.

5. CONCLUDING REMARKS

Apart from the threat of increasing nonresponse, the future for survey research looks very bright. The demand for statistical data for policy making and for empirical research has been increasing for many years and this upward trend is likely to continue. Extensions in the range of subject-matter for which survey data are required, the increased sophistication of the types of analyses that analysts want to conduct, and the technological changes occurring in the telecommunications industry will necessitate a continuing active program of methodological research. I foresee increasing demand for well-trained survey researchers to carry out these activities. The challenges are, first, how to attract people into this exciting field and, then, how to provide the training that is needed to enable them to appropriately apply the advanced methods that are in widespread current use and also to develop innovative methods for the new problems that will undoubtedly arise.

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