

# Reflections on Appraising Statistical Records

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**Abstract:** Statistical records have been created since the beginning of recorded history, about 3000 B.C.; nevertheless, apparently no specific guidelines for the appraisal of such records have been produced. This article, based on several decades of reflection about archivists' concern for the disposition of materials, examines the burdensome task archival appraisers face in dealing with the typically massive files created by major censuses and surveys. These records may include planning documentation, questionnaires, tabulations, studies, and publications. The article concludes with a suggested method of evaluating the records.

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ONLY IN THE LATTER half of the nineteenth century—and especially since the First World War—did custodians of statistical records begin to plan the ultimate disposition of materials.<sup>1</sup> The earliest statistical records, laboriously written on clay tablets, wood, or stone, contained data about persons and things needed for survival of communities—men eligible for military service, weapons, livestock, and produce. They were not destroyed by the creators and, because of the media's preservability, remain in numerous repositories.<sup>2</sup>

In Europe and the Levant most extensive statistical programs lapsed from the time of the disintegration of the Roman Empire until about the seventeenth century. (In the Middle Ages churches and some municipalities maintained local registers that are excellent sources for social statistics.) The *Domesday Book* of 1086 is the exception. It provided William the Conqueror with detailed data needed to administer Britain. Half of a millennium passed before other monarchs required statistical data when they gained ascendancy over feudal lords. Monarchs in France and Spain, for example, conducted fairly extensive statistical operations to facilitate the administration of

their domains during the seventeenth and eighteenth centuries. A considerable proportion of records from these surveys remain in archival repositories.

The American political leadership during the Federal Period showed substantial interest in statistical programs. James Madison recommended detailed commercial statistics shortly after the first Congress convened. Later, Madison unsuccessfully proposed that the first decennial census required by the Constitution (Art. I, Sect. 3) be used to collect occupational statistics.<sup>4</sup> In 1810 the census was expanded to include a questionnaire for data on manufactures.<sup>5</sup> By 1870 the decennial census included social and economic schedules. After the 1870 census the U.S. Department of Interior announced its plan to destroy all schedules after their tabulation for publication. Only Alexander Graham Bell's intervention saved the records for the first nine censuses. His assertion of their value for continuing research resulted in the binding and preservation of these vital sources.<sup>6</sup>

### The Status of Appraisal

Appraisals of statistical records—whether created by federal, state, quasi-

<sup>1</sup>For the purposes of this essay statistical records comprise the broad range of documentation produced for government censuses and surveys. This documentation concerns planning censuses and surveys, drafting schedules and questionnaires, collecting and editing data, tabulating and analyzing data, and compiling the final products (graphic materials, studies, reports, and publications). The use of statistical techniques for the physical and biological sciences is best dealt with separately, especially by archivists who are responsible for such records. The term *schedule* refers to forms for recording tabular, quantitative data. *Questionnaires* are forms, usually completed by respondents, for recording quantitative and narrative information. *Statistics*, when used in the plural, refers to data. In the singular the term may be defined as the methodological body of knowledge concerning the collection and the processing of data.

<sup>2</sup>Ernst Posner, *Archives in the Ancient World* (Cambridge, Mass: Harvard University Press, 1972), 30–31; *Bible*, Num. 1:1–54. The staff of the U.S. Bureau of the Census pays homage to ancestors by displaying in a main corridor a copy of a seventh century B.C. clay tablet from the royal archives of Assyria, which records the names of persons and their possessions.

<sup>3</sup>Bertrand Gille, *Les Sources Statistiques du XVII<sup>e</sup> Siècle à 1870* (Geneva: Librairie Droz, 1964); John Koren, *The History of Statistics: Their Development and Progress in Many Countries* (New York: Macmillan, 1918), 15–17, 217–77, *passim*; Meyer H. Fishbein, "Early Business Statistics of the Federal Government," *National Archives Accessions*, no. 54 (June 1958), 2.

<sup>4</sup>Fishbein, "Early Business Statistics," 3.

<sup>5</sup>Fishbein, "The Census of Manufactures, 1810–1890," *National Archives Accessions*, no. 57 (June 1963), 2.

<sup>6</sup>Robert V. Bruce, *Alexander Graham Bell and the Conquest of Silence* (Boston: Little-Brown, 1973), 413–15.

public or private institutions—severely challenge archivists. Such records tend to be voluminous and often include diffuse documentation about methodology and post-enumeration analyses. Furthermore, legislators have been increasingly concerned about the release of personal and institutional data. Former Senator Sam Ervin, Jr., for example, at a 1971 meeting of computer specialists expressed his concern about the invasion of privacy by collecting and computerizing private data. He referred specifically to questions included in the 1970 census.<sup>7</sup>

Arguments for and against eventual release of personal data appear in the published proceedings of a 1968 conference on statistical sources. An official of the Bureau of the Census, on the one hand, asserted that the bureau must preserve the confidentiality of its unaggregated data if it is to continue as an effective data collection agency. Similar arguments are used by other statistical agencies. A leading social historian, on the other hand, spoke about the increasing demands for statistical data for important research. He pleaded with archivists to effectively preserve microdata that may be used for studies about economic development, social mobility, social organization, migration, and political activity. An econometrician who had published major studies on national income patterns concurred. Several participants actually suggested that all statistical data in machine-readable form should be preserved.<sup>8</sup>

To my knowledge, notwithstanding the increasing supplies of and demands for

statistical sources, archivists have not developed guidelines for their appraisal. Two early publications by distinguished American archivists do deal with statistical records. In a 1946 study G. Philip Bauer mentioned the voluminous records that are by-products of investigational studies and reports. Raw statistical data (schedules, tabulations, and workpapers), Bauer asserted, have only temporary value to the creators; any residual values of raw data would be satisfied by final tabulations.<sup>9</sup>

Bauer felt justified in his evaluation because few historians requested unaggregated data; however, as a member of the NARS Business Economics Branch, he knew that economists were requesting raw data about American industry. Because of the access restrictions on data about individual companies, the branch had been preparing aggregate data for at least three companies in an effort to promote the use of archival resources.

A decade later, T. R. Schellenberg concurred with Bauer, even though during this early period of the computer revolution econometricians were requesting massive amounts of microdata. A few political scientists and historians were also experimenting successfully with automated techniques to verify generalizations about the behavior of classes of persons and institutions.<sup>10</sup>

In 1964 a French economic historian who had several years of archival experience deplored the destruction of valuable statistical series that should have been retained at the French National Archives; however, he did not suggest criteria for

<sup>7</sup>Sam Ervin, Jr., "Ervin Tells Conference Computer Age Touches First Amendment," News Release, 20 May 1971.

<sup>8</sup>Meyer H. Fishbein, ed., *The National Archives and Statistical Research* (Athens, Ohio: Ohio University Press, 1973), 29–30, 41–59, 64–69, 74–77.

<sup>9</sup>*The Appraisal of Current and Recent Records*, National Archives Staff Information Circular, no. 13 (June 1946), 11.

<sup>10</sup>T. R. Schellenberg, *The Appraisal of Modern Public Records*, National Archives Bulletin, no. 8 (October 1956), 42; William O. Aydelotte, "Quantification in History," *American History Review* 71 (1967), 803–29; Jerome Clubb and Howard W. Allen "Computers and Historical Studies," *Journal of American History* 54 (1967), 599–607.

their evaluation. In Sweden since 1981 joint appraisal by the Royal Archives and the major statistical organization has provided for the preservation of computerized data generated by major censuses and surveys. Nevertheless, standards for all types of statistical documentation are apparently absent. In fact, program tapes for access to the data are assigned to the library rather than the archives of the Swedish National Central Bureau.<sup>11</sup>

Maynard J. Brichford in his 1977 SAA manual on appraisal listed census rolls, on the one hand, among the “usually valuable” records. On the other hand, he included schedules, statistical tables, and tabulations among the “often” and “occasionally” valuable files.<sup>12</sup>

The implication was that survey records were less valuable than census enumerations. Church registers would thus be more valuable than a survey of the economic status and opinions of congregants. This evaluation conforms with traditional appraisal practices; however, merging the two series would provide significant sources of information for social history. Similarly, merging data from censuses of manufactures with specialized surveys of industry could add considerably to knowledge of economic development. The chief value of censuses for long-term research pertains to the periodic recording of similar data. Since it is true, however, that definitions of data elements change and some terms become obsolete, eventually there may be little correlation between early and contemporary census schedules.

Based in part on his experience with machine-readable records, Charles M. Dollar was one of a small minority of

American and foreign archivists who recognized the value of unaggregated statistical sources. In a 1978 article in the *American Archivist* he stated that census data at the enumeration district level—or better at the household level—had greater research value than summary data at the county level. By expanding on this theme Dollar could have developed general criteria for appraising statistical records.<sup>13</sup>

Michael Cook, the archivist of the University of Liverpool, noted Dollar’s evaluation with approval. In addition, Cook warned of the problem of confidentiality and access to personal data.<sup>14</sup>

### Appraisal Guidelines

Most archivists who accession records have had or will have occasions to appraise statistical materials. Statisticians in the creating institution may provide aid in interpreting their records. Archivists with some education in statistics will feel more secure in their judgments than those without any statistical training. While formal education is not essential, it is desirable for archivists to be informed about some statistical terms and to know from whom to seek advice in deciding to destroy, temporarily retain, or to preserve records of statistical surveys.

Archivists should be familiar with survey procedures, media, and the related records. They should understand some statistical concepts and terminology, such as universal, random, and selective sampling; margin of error; nominal, ordinal, and derivative data; microdata and macrodata; “populations” as used by statisticians; data bases, sets, and files, ecological units; and secular trends. Elementary

<sup>11</sup>Gille, *Les Sources Statistiques*, 15; National Central Bureau of the Office of Statistics of Sweden, *A Guide to the SCB [Statistiska Centralbyrån]* (Stockholm: 1979).

<sup>12</sup>Brichford, *Archives & Manuscripts: Appraisal & Accessioning* (Chicago: Society of American Archivists, 1977), 22–23.

<sup>13</sup>Dollar, “Appraising Machine-Readable Records,” *American Archivist* 41(October 1978): 424–25.

<sup>14</sup>Cook, *Archives and the Computer* (London: Butterworth, 1980), 95–96.

texts in statistics available in all university libraries are usually satisfactory.<sup>15</sup>

It is much more important that archivists understand and be able to apply the art and techniques of appraisal than that they have a knowledge of statistical theory and practice. With due regard for the masses of records requiring evaluation, archivists must make reasoned judgments within a reasonable time. For some survey files, a reasonable time may be a matter of hours—for example, when archivists concur fully with previous decisions on similar, earlier surveys. When doubts arise or the archivist is confronted with new problems, the reasonable time may be days or even weeks. Some of the appraiser's time may be spent interviewing statistical or subject matter specialists.

The counsel of statisticians and/or subject matter specialists is especially recommended when archivists consider sampling. After evaluating their recommendations in the light of archival economy and expectations on research use of the concerned records, the archivist will be prepared to make the final decision.

The initial disposition decision reflects the primary value of the records to the agency of origin. This process is the responsibility of the person who manages the records program; however, an archivist may be consulted or, in certain agencies (many foreign and non-governmental archives), the archivist is also the records manager. Decisions on primary values rest, in part, on answers to the following questions:

1. Has the survey been satisfactorily completed?
2. Will the raw data be merged later with other survey statistics?
3. Must the data be retained temporarily to validate the published statistics and analyses?

Occasionally, all the data collected for a census or survey are not tabulated. Funds may have been curtailed or the need for certain tabulations of selected data may delay tabulating the remainder. When the schedules or questionnaires are considered for destruction or retirement to another repository, appraisers should determine whether the creating agency plans additional tabulations in the near future. The records should then remain in current storage or in a readily accessible facility.

After the data has been adequately tabulated, appraisers may learn that statisticians or researchers are planning to merge the raw data with other sources. In that case, the data should be retained until the project is completed or abandoned.

Major statistical publications are usually reviewed by prominent statisticians for the methodology of the census or survey. The source data for such publications should be retained for about two years to validate the project. Thereafter, archivists may begin the evaluation of all the records pertaining to the publication to determine whether any segments deserve archival preservation.

It is desirable to start this process with an examination of records concerning the administration of the survey. These evidential records document the unit that conducted the survey, assignment of personnel and plans for collecting, tabulating, and publishing data. Secondary users of the data rarely request these essential records; nevertheless, substantive series or portions of series that document administration should be preserved. The validity of the data depends on the quality of the statistical methodology and the professionalism of the statistical staff; furthermore, the accuracy and reliability of data are dependent on the efficiency of

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<sup>15</sup>For example, see H.M. Blalock, *Social Statistics*, 2nd ed. (New York: McGraw-Hill, 1979).

the survey administration. Unfortunately, an international survey of the archives of statistical agencies revealed that not only were most data sources destroyed, but that little or no related administrative materials were being retained.<sup>16</sup>

Planning records should explain the conceptual framework for the survey, population (the number and types of units included), method of collection (questionnaire, letter, telephone, or other), sampling criteria for pretests and the enumeration, and proposed analyses of the data. The content of the inquiries has a direct bearing on the validity and interpretation of the data; therefore, any minutes of meetings or other documentation about the content should be retained. On the one hand, all drafts of the inquiries need not be retained if the changes are not substantive. On the other hand, changes that reflect political or scientific considerations should be documented. It is advisable to retain the first and final drafts of the inquiries.

The chief challenge of appraising survey files is determining the disposition of schedules and questionnaires and of any unpublished aggregations.<sup>17</sup> Archivists may begin their evaluations by studying a complete set of final publications generated from the survey. The publications summarize the survey objectives and methodology, including a fair copy or paraphrase of the source documents. In recent years publications also review computing procedures. The main section of the publications is composed of the final tabulations. When all of this information is included in the publication, examination of the detailed administrative records may not be necessary to determine how the survey was conducted. Evaluations of the quality of returns, however,

are unlikely to appear in the publications. Staff memoranda may comment on processing problems and the completeness and accuracy of responses. Alternatively, the appraiser may find that the returns are heavily edited with imputed data. While considerable editing of the original returns does influence the archivist's evaluation, it does not of itself determine disposition.

Decisions regarding disposition are based on the value of the data elements for secondary research not satisfied by the published tabulations. Appraisers should consider the following questions concerning the continuing value of replies to surveys and intermediate tabulations:

1. How unique and valuable are the data relating to the individual units included in the survey?
2. Can the data be merged profitably with other sources?
3. Have the raw data been corrected?
4. Does a tabulating bias suggest retention?
5. Were all significant data published?
6. Do the returns represent a sample of the population, and/or may a well-planned sample preserve the essential values of the returns?
7. When may individual data be released?
8. May miniaturization of the returns save space and increase accessibility?

Raw data are often replete with errors. At best, the returns are edited, the editor is identified, and the date of correction is recorded. This recommended procedure, however, is used rarely by state and local governments, private organizations, and most federal agencies. Statisticians may correct the data during tabulation, thus leaving the errors on the original returns.

<sup>16</sup>Lisa Kaiser, "Selection of Statistical Primary Material," *Archivum* 6 (1956), 75.

<sup>17</sup>Statistical agencies may grant access to schedules or related automated records for special studies. When the agencies retain the tabulations and studies, archivists may appraise them as records. Tabulations and studies based on archives may be retained by the archives as adjunct manuscripts.



Although a small margin of error may not be significant in the long term, a high level of errors in many returns may justify disposal of the schedules. When archivists find it difficult to decide whether the degree of error justifies disposal, they should consult statisticians.

Schedules and questionnaires may also deserve preservation when the tabulated and published statistics show biases. For example, Francis Amasa Walker, who directed the Ninth and Tenth Decennial Censuses, had little interest in statistics for western states. He therefore neglected to review returns for these states carefully.<sup>18</sup> While similar biases are now rare, tabulations are often skewed by the objectives of the census or survey. Federal censuses are tabulated by state, county, and city; researchers may wish to tabulate the data by family size, occupation, income, and the like. Other forms of bias may be discovered.

When the answers to the first five questions listed above suggest that retention is advisable, an appraiser may consider sampling instead of total retention. An early essay on this topic by Paul Lewinson noted the difference between selective retention and statistical sampling.<sup>20</sup> Either method may be judiciously applied to survey returns.

Selective retention may be used when certain questionnaires contain valuable data and others do not. For example, an archivist may select from among thousands of returns from manufacturing establishments those that record more than a given number of employees. Such a sample, however, may have limited value without time series of related data, or without returns from smaller companies

for comparative studies. Statistical sampling probably has greater justification because all units have an equal chance of being retained. This method of retention is recommended when the sample returns include all of the most significant variables.

When the survey returns represent a sample of a population, the appraiser should determine whether the sample limits the secondary value of the raw data. For example, many of the pre-1950 censuses are particularly valuable because demographic, economic, and social data were recorded for all individuals. Since 1950, a considerable portion of such data is recorded for only a sample of the population. The new procedure makes the individual returns less valuable for cross-tabulations.

Sampling reduces the volume of survey records. Miniaturization accomplishes the same objective while retaining all returns. Traditionally the medium for recording information has been considered irrelevant for appraisal of research values. When paper became widely used in western Europe in the early fourteenth century, registries assumed that the information in paper form must be of transitory interest. Surely if the information had been significant, it would have been recorded on the highest quality parchment! After a few generations, paper records were no longer denigrated. Similarly—and fortunately—archivists no longer consider electronic media (tape, disks, chips) non-record material that is unsuitable for archival storage.

Most surveys now utilize microfilm and/or automated techniques. Some organizations use automation to optically

<sup>18</sup>Fishbein, "Census of Manufactures," 14n.

<sup>19</sup>William C. Shelton, "Impartiality, Integrity and Objectivity in Federal Statistics," Paper presented at the 1985 annual meeting of the American Statistical Association; J. Morgan Kousser, "Must Historians Regress? An Answer to Lee Benson," *Historical Methods* (Spring 1986): 63.

<sup>20</sup>Lewinson, "Archival Sampling," *American Archivist* 20 (October 1957): 291-312. For a bibliographic essay on archival sampling, see David R. Kepley, "Sampling in Archives: A Review," *American Archivist* 47 (Summer 1984): 237-42.

scan microfilm copies of statistical schedules (FOSDIC). Such microfilm must be of high quality and likely to be suitable for preservation.

While automating statistical operations may aid appraisers by formalizing procedures, providing rapid access to data, and reducing the volume of records, it creates new problems. Not all data in returns are transferred to electronic media. Sometimes identifiers are transcribed during an initial run and eliminated from the next run. One run may have all quantitative data and additional runs may summarize or aggregate the data for several units. Major surveys often generate numerous levels of aggregation for intermediate and special reports before the production of the final publication tapes. Each of these files, in tape or printout form, requires appraisal.<sup>21</sup>

The rapid access to computerized data increases concern about protection of privacy. Secrecy is maintained by encryption and severely limiting access to computer files. Most archives store privileged data, but the problems of privacy for paper and electronic records differ. Private data in paper records are visible and may be restricted by document or by excising confidential data in reproductions. Those who fear release of computerized data should be reassured to know that private identifiers may be surpressed in transcriptions or printouts.

Archivists are well aware that the publications produced for censuses and surveys should be retained; however, many may not be alerted to the existence of significant related records created after the publication. These records include memoranda, letters, and studies that embody criticisms and analyses of the publications. Also, statistical maps and charts

are usually located in the publications, and others may be produced after publication. These, too, require appraisal.

Occasionally archivists learn that particular statistical operations represent major innovations in theory and practice. In such situations they should seek the innovators' office files and workpapers.

### Conclusion

Before the computer age few researchers other than genealogists and rare social scientists requested and used massive statistical records. Now many scholars recommend retention of all raw data files that *may* have residual values. They justify their proposal by citing past failures to appreciate secondary value of numerous survey files. They call attention to the compaction of data on computer media and the decreasing cost and increasing utility of microcomputers.

Historians and social scientists, in calling attention to the relatively low cost of computer hardware, often fail to appreciate the high cost of preserving electronic media. Electronic media pose special problems familiar to all who operate archival units for machine-readable records. Even if all preservation problems are resolved by such media as computer output microfilm (COM) and videodisks, archivists should not burden their agencies and researchers with raw data of doubtful value.

Selection from among the ever-growing body of statistical survey materials requires study of all documents for each survey. For difficult decisions involving masses of paper and machine-readable records, knowledge of statistical methodology is helpful. Alternatively, archivists should seek expert advice about the values of the numerous series generat-

<sup>21</sup>Literature on methods of handling automated records is being produced in growing quantity. For an elementary text, see the author's *Guidelines for Administering Machine-Readable Archives* (Washington, D.C. and Bonn, Germany: Committee on Automation of the International Council on Archives, 1980). For scheduling guidelines, see *The National Archives and Records Service General Schedule No. 20* (FPMR 101-11.4).



ed by a survey. The appraisers should be aware, however, that most statisticians approve disposal of schedules and questionnaires soon after they complete a survey. In fact, statisticians only recently expressed interest in preserving their records.<sup>22</sup> The opinions of potential users may be sought when the appraisers are uncertain of long-term values.

Appraisal is the most challenging archival responsibility. Of the challenges, statistical materials often prove the most taxing. This essay offers elementary guidelines for dealing with this particular challenge.

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<sup>22</sup>Occasionally statisticians keep methodological records on completed surveys in the expectation that they would benefit from past improvements or mistakes. In 1983 the American Statistical Association established the Committee on the Preservation of Documentation of Distinguished Statisticians. A committee on the preservation of statistical sources would also be useful.