

Reference Information Paper No. 50

The Censuses of Manufactures  
1810-1890

National Archives and Records Service  
General Services Administration  
Washington: 1973

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by Meyer H. Fishbein

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## FOREWORD

THE GENERAL SERVICES ADMINISTRATION, through the National Archives and Records Service, is responsible for administering the permanent noncurrent records of the Federal Government. These archival holdings, now amounting to more than 1 million cubic feet, date from the days of the First Continental Congress and consist of the basic records of the legislative, judicial, and executive branches of our Government. The Presidential libraries of Herbert Hoover, Franklin D. Roosevelt, Harry S. Truman, Dwight D. Eisenhower, John F. Kennedy, and Lyndon B. Johnson contain the papers of those Presidents and many of their associates in office. While many of the archival holdings document events of great moment in our Nation's history, most of them are preserved because of their continuing practical use in the ordinary processes of government, for the protection of private rights, and for the research use of scholars and students.

To facilitate the use of the records and to describe their nature and content, archivists prepare various kinds of finding aids. The present work is one such publication. We believe that it will prove valuable to anyone who wishes to use the records it describes.

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## PREFACE

REFERENCE INFORMATION PAPERS are published by the National Archives as part of its records description program. The reference information paper describes records dealing with some special subject. Its form and style are not fixed but vary according to the nature of the records to which it relates. Its distinguishing characteristic is that it analyzes records on a much narrower subject area than is characteristic of more general guides.

In addition to reference information papers and other finding aids that relate to particular record groups, the National Archives issues publications that give an overall picture of materials in its custody. A new, comprehensive *Guide to the National Archives of the United States* will be issued. A guide devoted to one geographical area—*Guide to Materials on Latin America in the National Archives* (1961)—has been published. Records of the Civil War are described in *Guide to Federal Archives Relating to the Civil War* (1962), *Guide to the Archives of the Government of the Confederate States of America* (1968), and *Civil War Maps in the National Archives* (1964); those of World War I in *Handbook of Federal World War I Agencies and Their Records, 1917-1921* (1943); and those of World War II in the two-volume guide, *Federal Records of World War II* (1950-51). Genealogical records are described in *Guide to Genealogical Records in the National Archives* (1964). Among the holdings of the National Archives are large quantities of audiovisual materials received from all sources: Government, private, and commercial. The *Guide to the Ford Film Collection in the National Archives* (1970) describes one of the largest private gift collections. The extensive body of maps and charts is described in the *Guide to Cartographic Records in the National Archives* (1971).

Many bodies of records of high research value have been microfilmed by the National Archives as a form of publication. Positive prints of these microfilm publications, many of which are described in the current *List of National Archives Microfilm Publications*, are available for purchase. For other publications, see the most recent *Select List of Publications of the National Archives and Records Service*, General Information Leaflet No. 3.

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This reference information paper is one of a series prepared for distribution at the National Archives Conference on Statistical Research, held in Washington, D.C., May 27-28, 1968. The conference was convened to acquaint scholars with the voluminous statistical material in the National Archives and to provide an opportunity for discussions of the problems of preserving and using contemporary quantitative sources. The papers and discussions cover also the current production of conventional and electronic statistical source records and the criteria for preserving those records for future research. The proceedings of this conference were published in *The National Archives and Statistical Research*, edited by Meyer H. Fishbein (Athens: Ohio University Press, 1973).

## INTRODUCTION

GROWING INTEREST in U.S. industrial history should focus attention on the usefulness of the contemporary histories and statistical tabulations prepared in connection with 19th-century censuses. Current historians, however, show little consistency in their treatment of census data. Some virtually ignore this substantial body of literature. Others quote the statistical or narrative evidence without warning the reader about the factual limitations of the data and, except for occasional references to the inadequacy of early census procedures, they avoid the question of validity.<sup>1</sup>

When Harold Faulkner wrote in *American Economic History* that "the bases for the study of manufactures since the Civil War are the census reports," he referred particularly to the censuses of 1900 and 1910.<sup>2</sup> Ethel D. Hoover, a U.S. Bureau of Labor Statistics official, on the other hand, found the report dealing with retail prices for the 1880 census "the only extensive compilation of retail prices for the nineteenth century."<sup>3</sup>

An examination of many recent studies in economic history shows the following prevalent attitudes toward the long-range 1810-90 reports:

1. Because the census reports for 1810-40 are considered too inaccurate for quantitative or qualitative analysis, they are rarely cited.
2. Quantitative data from the reports for the period 1850-90 are useful mainly to show trends.
3. Industrial histories included in the reports are virtually ignored.

The terminal date of 1890 for this study was chosen for several reasons. By the time the 1890 census reports were published, statistical standards had been developed by which the 1890 and later reports could be judged. As will be shown, the reports had come under severe scrutiny by professionally trained academicians. After the 1890's the sources for industrial data, particularly the

<sup>1</sup> Victor S. Clark rarely cited 19th-century census data in his *History of Manufactures in the United States* (3 vols., New York, 1929). He ignored, for example, the reports for the period 1810-50, although he used 1860 census figures without comment (2:10). Elsewhere he quoted census data derived from other sources, for example, textile data from trade publications (2:183). In one passage (2:416-417), Clark described the growth of cotton manufactures from 1870 to 1890, based on census reports. Although Clark accepted the figures without modification, he warned the reader to consider adjustments to account for changes in the value of the dollar. Nowhere does he cite the interesting and informative histories of American industries included in most of the census reports.

<sup>2</sup> Harold U. Faulkner, *American Economic History* (7th ed; New York, 1964), p. 765.

<sup>3</sup> *Journal of Economic History*, Vol. 18 (Sept. 1958), p. 308.

trade press and professional journals, burgeoned to such a degree that census officials found they no longer needed to analyze data for their readers. And, finally, the establishment of a permanent Census Office when the 1900 census was being prepared for publication resulted in a continuity of service that raised the professional competence of census employees.

To provide historians with a substantial commentary on the reports, they will be examined in terms of the professional qualifications of their authors, the adequacy of the procedures used in gathering data, and the contents of each.

## THE CENSUS OF 1810

The first recorded proposal for collecting industrial data as part of the U.S. census was the unsuccessful recommendation by James Madison that the census of 1790 include occupational statistics.<sup>4</sup> Similar proposals were offered to Congress for the 1800 census by the Connecticut Academy of Arts and Sciences and the American Philosophical Society.<sup>5</sup>

The possibility that the Napoleonic Wars would deprive the Nation of foreign sources for manufactured goods increased the already substantial Congressional interest in manufactures. Congress, in a House resolution of June 7, 1809, therefore requested the Secretary of the Treasury to report on means of protecting and fostering manufacturing establishments. Secretary Albert Gallatin reported that he was prevented from making concrete proposals by the lack of adequate statistical data.<sup>6</sup> He noted that the approaching census would afford an opportunity to collect these data.

In accordance with Gallatin's suggestion, Congress, on May 1, 1810, amended the act for the Third Census to provide for the collection and tabulation of data on manufacturing establishments. The amendment referred neither to the nature of the inquiry nor to the method of collecting data, but merely directed the "several marshals, secretaries, and their assistants to prepare an account of the several manufacturing establishments and manufactures within their several districts, territories, and divisions" (2 Stat. 605). The schedules and related abstracts were to be sent to the Secretary of the Treasury, who would presumably report to Congress.

Some of the enumerators recognized that they had been assigned the virtually impossible task of conducting the first national census of manufactures with barely any instructions, no special training, and no questionnaire. One assistant marshal wrote that the census of manufactures took most of his time and was much more troublesome than the census of population.<sup>7</sup> The enumera-

<sup>4</sup> *Annals of Congress*, 1st Cong., 2d sess., pp. 1115, 1118, 1145-1147.

<sup>5</sup> *House Report 3*, 41st Cong., 2d sess., pp. 35-37.

<sup>6</sup> *American State Papers, Finance*, Vol. 2, pp. 425-439.

<sup>7</sup> Population Schedules for the Census of 1810, North Carolina, Vol. 3, p. 190. Records of the Bureau of the Census, Record Group 29, National Archives Building. Hereinafter, records in the National Archives Building are cited by the symbol NA and RG followed by the record group number.

tor for Northumberland County, Virginia, described his procedure as follows: "As there was no form prescribed for taking manufacturing establishments, I have taken the most general of them and those that are most easily ascertained, such as the gallons of Brandy distilled. . . ."<sup>8</sup>

In addition to the difficulties encountered in collecting manufacturing data for the first time, enumerators were confronted with resistance to any questions about business operations. The enumerator for Rutherford County, North Carolina, for example, was denied data after the rumor circulated that the information was required for tax purposes.<sup>9</sup> Another North Carolinian reported that his requests for data "created Jealousies in the minds of a Great Number of the people, consequently No Great reliance can be placed on the same."<sup>10</sup>

After the returns arrived in the Secretary's office, Gallatin sought the aid of one of the few persons qualified to evaluate the data, Purveyor of Public Supplies Tench Coxe. Coxe had studied the development of American manufactures for more than two decades and had apparently assisted Alexander Hamilton in preparing his Report on Manufactures. He had also compiled statistics on foreign trade.<sup>11</sup>

Coxe was probably quite disappointed in the quantity and quality of the returns received by the Secretary. He therefore published in *Niles Register* of December 21, 1811, a circular containing a sample of the type of return he wished for each establishment, as follows:

George B. Williams, of the township of Northampton, county of Berkshire, and state of Massachusetts, makes and sells broad cloths at two dollars and one-half, to three dollars per yard; blankets at three to three dollars and one-half each; narrow cloths at one dollar and one-third, to one dollar and one-half per yard; total of goods in a year 4231 yards of broad cloth, 7368 yards narrow cloth and 413 blankets. Total value 25,511 dollars and 45 cents.

The said George Williams employs and moves by water one carding machine and 150 spindles; and by hand four hundred and ten spindles in the woolen manufacture.

To publicize the census of manufactures, Coxe's circular requested "every gentleman in public station" to send the issue of the journal to "three or more public spirited and intelligent citizens in their respective states and districts" in the hope that they would submit additional schedules. There is no record that the circular achieved its objective.

Congressman Adam Seybert of Pennsylvania, in recognition of Coxe's

<sup>8</sup> Population Schedules, 1810, Virginia, Vol. 5, p. 969.

<sup>9</sup> Population Schedules, 1810, North Carolina, Vol. 5, p. 147.

<sup>10</sup> Population Schedules, 1810, North Carolina, Vol. 3, p. 203.

<sup>11</sup> Meyer H. Fishbein, *Early Business Statistical Operations of the Federal Government*, National Archives Reference Information Paper No. 51 (Washington, D.C., 1973) pp. 4-6; and Harold Mutcherson, *Tench Coxe; a Study in American Economic Development*, (Baltimore, 1938), pp. 1-30.

work in behalf of the census, successfully proposed a resolution that directed "an agent" of the Secretary of the Treasury

to employ a person to digest and reduce to such form as shall be deemed most conducive to the interests of the United States, a statement of the number, nature, extent, situation, and value of the arts and manufactures of the United States, together with such other details, connected with these subjects, as can be made from the abstracts and other documents and returns, reported to him by the marshals and other persons employed to collect information in conformity to the second section of the act of the first of May, one thousand eight hundred and ten, and such other information as has been or may be obtained, which the subject will admit of; and that he report the same to Congress.<sup>12</sup>

Despite obvious inadequacies in the returns received by the Secretary, Coxe prepared the report required by Seybert's resolution. Although Coxe—and all other contemporary statisticians—lacked knowledge of techniques for collecting and tabulating economic data, he explicitly stated in the introduction to his report that the data were incomplete and inaccurate.

It may, however, be affirmed, that the tables contain a great number and variety of clear indications of the state of the manufacturing branch of the national industry, and a mass of positive evidence upon the subject, in relation to the Eastern, Northern, Middle, Southern, Atlantic, and Western sections or grand divisions of the country, with respect to the forms or modes of the manufactures which have grown up, the raw materials upon which they operate, a very considerable portion of the value to which they have arisen, very useful data for the comparative value of *internal commerce or manufactures, and external commerce or navigation and foreign trade*, and much elucidation of the operations of manufacturing industry upon the commercial and the landed interests, and upon the public safety.<sup>13</sup>

The organization of Coxe's census report was followed in general in the reports of manufactures for the second half of the 19th century. It consisted of (1) the transmittal correspondence, (2) procedural information, (3) studies of important industries (textiles, iron, leather, and others), (4) tabulations of data concerning individual commodities with totals for State or territory, and (5) similar data arranged geographically by State and county, with totals for commodities.<sup>14</sup> Each of these parts has features of interest to economic historians.

Coxe's letter of transmittal asserted that the report, though its quantitative data were estimated, showed "the true state of the body politic in its various numbers and operations." Coxe noted, in this connection, that he had separated

<sup>12</sup> 2 Stat. 786.

<sup>13</sup> *American State Papers, Finance*, Vol. 2, p. 677.

<sup>14</sup> *Ibid.*, pp. 666–812.

the narrative from the statistical sections so that "neither might obscure or injure the other."

In his introductory statements, Coxe candidly revealed his intention to broaden the scope of his report to include "all pertinent information of an authoritative character" that would be "conducive to the interests of the United States." He therefore included in the report comments about agricultural production, commerce and navigation, fisheries, the relationship of manufactures to national security, the fine arts, and social and economic conditions favorable to manufacturing enterprises. These brief essays concerning American progress and potentials summarize and develop the views Coxe had expressed in a series of papers he prepared about the time of the Constitutional Convention.<sup>15</sup>

The tabular section of the report contains so many inaccuracies that its usefulness for research may be seriously questioned. Coxe prefaced the section with a warning about the incompleteness of the data. A contemporary critic of the report noted that, while the sections for Massachusetts were "remarkably correct," those for New Jersey were incomplete and inaccurate and those for South Carolina were "careless beyond any of the returns." He accurately noted that the data were so lacking in comparability that it was "impossible to class them under corresponding heads."<sup>16</sup>

These errors and others of a clerical nature may be demonstrated by comparing the published data with the existing, fragmentary schedules in the National Archives.<sup>17</sup> Deficiencies in tabulating and transcribing data appear most frequently in the returns for North Carolina. The published tabulation for Carteret County, for example, shows 413 looms. This figure was an incorrect transcription of the enumerator's extrapolation of the 126 looms found in 210 out of 670 families.<sup>18</sup> The enumerator for Cabarrus County reported the production of 20,225 gallons of whiskey; the published production appears as 20,221 gallons. This error is insignificant as against the addition of an unexplained valuation of \$10,000 for the whiskey, although the deputy marshal failed to report on its valuation.

In transcribing data for Surrey County, Coxe (or his clerk) made several gross errors. First, he rounded out some figures while transcribing others without change. Seventeen hundred yards of fulled cloth appears in the report as 17,000 yards; furthermore, while the enumerator listed the value as \$1 per yard, the report shows a total value of \$500. Both the report and the schedule show 5

<sup>15</sup> See Tench Coxe, *A View of the United States of America* (London, 1795), and *Observations on the Agriculture, Manufactures, and Commerce of the United States* (New York, 1789).

<sup>16</sup> Letter of Samuel Mitchell to Thomas Newton, January 7, 1812, published in the *American Medical and Philosophical Register*, April 1812, and reprinted in a book of the same title, pp. 405–408 (New York, 1814).

<sup>17</sup> All manufacturing schedules were presumed lost when the British burned part of the Capital during the War of 1812. An examination of the population schedules, which were not in Washington at that time, revealed, however, that several marshals and their deputies combined the manufacturing and population statistics on the same enumeration schedules.

<sup>18</sup> Population Schedules, 1810, North Carolina, 2:186, NA, RG 29.

bloomeries, but the report failed to note the production of 156 tons of pig iron. Finally, 550 hides appears as 580 hides.<sup>19</sup> Similar errors may be found by comparing the original schedules with the published report for other North Carolina counties and several counties in New York, Maryland, and Massachusetts.<sup>20</sup>

While the critics of the Coxe report were unaware of these errors, they recognized that its data were of dubious validity. The *North American Review* of June 1815 (1:239 and 246) criticized Coxe because the returns for many States omitted several industries entirely, but it nevertheless admitted that the report as a whole gave "a strong impression of the actual extent of manufactured produce in the United States."

Apparently the critic was referring to the inaccuracies in the tabulations and to the generally valid comments about industrial development in Coxe's essays. In contrast with this journal's mixed review, Joshua Gilpin's report of 1832 rejected all of Coxe's findings on the grounds that they were "miserably executed."<sup>21</sup>

A more carefully considered judgment of the 1810 report was rendered by industrial historian J. Leander Bishop, thus:

The returns made upon the subject of manufactures, on account of the limited time allowed for taking the census, the absence of any formula or instruction to secure uniformity and completeness, and the reluctance or inability of many persons to give correct information, were necessarily irregular and discordant, as well as in many respects extremely deficient. The accounts from the different states and territories, and even from divisions of the same state, varied with the different views of the agents, their intelligence, industry and other qualifications, which rendered a comparison of the general results quite difficult. The returns fall far short of a full and reliable statement of the actual number and condition of the manufactures of the country. Those from Pennsylvania, Connecticut, Massachusetts, New York and Virginia, were the most complete, those from South Carolina the least so, but great deficiencies were apparent in all of them.<sup>22</sup>

Bishop continued his generally valid criticism with several examples of obvious deficiencies in the tabular data. He noted that certain trades and mills—bookbinding, calico printing and dyeing, glass making, and tinsmithing—were unreported by many enumerators. He nevertheless did not reject the entire report as worthless. "Notwithstanding their defects," Bishop wrote, "the returns contained a vast amount of valuable information which will be interesting in

<sup>19</sup> Population Schedules, 1810, North Carolina, 6:198.

<sup>20</sup> A list of the extant 1810 manufacturing schedules is available in the National Archives Building.

<sup>21</sup> *House Document* 308, 22d Cong., 1st sess., 2:849.

<sup>22</sup> J. Leander Bishop, *A History of American Manufactures from 1608-1860*, Vol. 2 (3d ed., Philadelphia, 1868), p. 159.

all future times as the first systematic statement of American manufactures in detail."<sup>23</sup>

A subsequent comment by an eminent statistician, S. N. D. North, appraised the report as follows:

Of the \$198,613,471 reported as the value of products, more than 60 per cent was estimated by Mr. Coxe. While the statistical value of such an estimate is doubtful, it does nevertheless afford a definite starting-point, undoubtedly conservative, from which our subsequent growth can be approximately measured, precisely as the growth of English wealth and resources is measured from the *Domesday Book*.<sup>24</sup>

Critics of the Coxe report have generally failed to distinguish between the quantitative and the qualitative data. Coxe called attention to specific deficiencies in the quantitative data by noting that the manufactures for Pennsylvania were grossly understated. But he rightly pointed out that the data are suggestive of the variety of industries developing in the State.<sup>25</sup> Rarely if ever do historians cite the technological information included in the Coxe report. He mentioned, for example, the technological revolution in the textile, boot and shoe, nail and rolling-mill, and iron and steel casting industries.<sup>26</sup> And he frequently brought up a favorite theme, which dated at least from 1789, concerning the interdependence of agriculture, mining, manufacturing, and commerce. These and other comments by a keen observer of economic phenomena are deserving of attention by students of industrial history and the history of American economic thought.

#### THE CENSUSES OF 1820 AND 1840

Of the contemporary critics of the Coxe report, Adam Seybert was the only one who offered a plan for improving the method of enumerating manufacturing establishments. Seybert represented his native Philadelphia in Congress (1809-15) when he had sponsored the resolution that gave legislative sanction to Coxe's work in connection with the 1810 census. He was reelected to Congress for a single term in 1817. Politics was one of Seybert's many professional interests, which included medicine, chemistry, mineralogy, and statistics. While he was preparing his deservedly famous *Statistical Annals*, Seybert was a member of the American Philosophical Society, the American Medical Society, the

<sup>23</sup> *Ibid.*, p. 160.

<sup>24</sup> S. N. D. North, "Manufactures in the Federal Census," *The Federal Census, Critical Essays by Members of the American Economic Association* (New York, 1899), p. 259.

<sup>25</sup> *American State Papers, Finance*, Vol. 2, p. 668.

<sup>26</sup> *Ibid.*, pp. 671, 676-677.

Chemical Society of Philadelphia, the Philosophical and Literary Society of New York, and the Royal Scientific Society of Gottingen.<sup>27</sup>

The *Annals* contain detailed information about American population, commerce, navigation, fisheries, public lands, post offices, the Federal budget, and the armed forces. Seybert's comments about manufactures and manufacturing statistics appear in the introductory chapter on the political, social, and economic progress of the Nation. "It is not long since the manufactories, within the United States, have gained the public attention," Seybert wrote; but, he continued, "now they are respectable, from their number, as well as on account of the many persons to whom they have given employment, and the capital which has been invested."<sup>28</sup>

Seybert went on to deplore the lack of accurate data about manufacturing. Concerning the 1810 census, he wrote, "Some elaborate and valuable returns were made and transmitted; the greater number of them were irregular, and evidently very deficient."<sup>29</sup>

To avoid the deficiencies that were quite evident in the Coxe report, Seybert recommended the use of a "formula" (questionnaire) issued by the Secretary of the Treasury with "proper instructions" to the enumerators. The questionnaire that Seybert suggested for the next census contained the following items:<sup>30</sup>

- The state in which the manufacture exists
- The nature of the manufacture
- Raw materials employed
  - the kind
  - the quantity annually consumed
  - the cost of the annual consumption
- Persons employed, number of
  - men
  - women
  - boys and girls
- Amount paid annually for wages
- Amount of capital invested
- Amount of contingent expenses
- Value of the articles which are annually manufactured
- General remarks concerning the establishment

After the publication of Seybert's work, there was increasing interest in attempting another census of manufactures. The dumping of European goods on the American market after the Napoleonic Wars and the depression of 1819 led to increasing demands for accurate data showing the state of industrial development. President Madison and several societies for the encouragement

<sup>27</sup> Henry Phillips, ed., *Early Proceedings of the American Philosophical Society, 1744 to 1838*, pp. 243, 246, 276, and 531 (Philadelphia, 1884), and "Adam Seybert" in the *Dictionary of American Biography*.

<sup>28</sup> Adam Seybert, *Statistical Annals* (Philadelphia, 1818), p. 6.

<sup>29</sup> *Ibid.*, p. 6; Seybert went on to describe some of the deficiencies noted above.

<sup>30</sup> *Ibid.*, p. 19.

of manufactures requested the Congress to authorize another census of manufactures. In January 1820, therefore, the bill providing for the census of that year contained a section authorizing a census of manufactures, excluding "household manufactures." An amended version of the bill was enacted on March 20, 1820 (3 Stat. 543-553).

Secretary of State John Quincy Adams, to whom the act gave responsibility for the census, studied Seybert's questionnaire and requested the advice of several officials in developing procedures for collecting industrial data.<sup>31</sup> After considerable deliberation he adopted Seybert's questionnaire with several improvements, as follows:

Name of the country, parish, township, town, or city where the manufacture exists.

Raw materials employed:

1. The kind.
2. The quantity annually consumed.
3. The cost of the annual consumption.

Number of persons employed:

4. Men
5. Women
6. Boys and girls.

Machinery:

7. Whole quantity and kind of machinery.
8. Quantity of machinery in operation.

Expenditures:

9. Amount of capital invested.
10. Amount paid annually for wages.
11. Amount of contingent expenses.

Production:

12. The nature and names of articles manufactured.
13. Market value of the articles which are annually manufactured.
14. General remarks concerning the establishment, as to its actual and past condition, the demand for, and sale of, its manufacture.

Adams' instructions to the U.S. marshals show his interest in methodology and his desire to avoid the mistakes of 1810. "The more particular the account of manufactures can be made," Adams wrote, "the more satisfactory will the returns prove."<sup>32</sup> Adams pointed out that Congress had not provided a penalty for refusing to supply manufacturing data; nevertheless, he expressed a hope

<sup>31</sup> Charles F. Adams, ed., *Memoirs of John Quincy Adams, Containing Portions of His Diary From 1795 to 1848*, Vol. 5 (Philadelphia, 1875), pp. 125, 130, 133, 135, 147, 148.

<sup>32</sup> Circular to the Marshal of the Eastern District of Virginia, June 20, 1820, Circulars of the Department of State, Vol. 1, NA, RG 59; Carroll D. Wright and William C. Hunt, *History and Growth of the United States Census, Prepared for the Senate Committee of the Census* (Washington, 1900), p. 135.

that Congressional interest in encouraging manufactures would result in widespread cooperation on the part of the owners. To aid the enumerators in describing establishments, Adams sent a list of products mentioned in Coxe's report and instructed them to give the questionnaire "to some person principally concerned in the manufacturing establishment, requesting him to give the information desired himself."

The procedures for enumerating manufacturing establishments contained several elements that are recognized by modern statisticians as mandatory to assure any degree of accuracy. Most of the data included in the printed schedule could readily be tabulated. The enumerators received some instructions, and the term "manufactures" was defined at least to the extent of eliminating home manufactures and artisan handicrafts. These improvements over the procedures used in the 1810 census did not, however, result in a report that was more useful for historical analysis than the earlier report. The chief reasons for the deficiencies in the 1820 compendium were the incompleteness and inaccuracy of the returns, the poor tabulation of the schedules, and Adams' refusal to study the returns in order to analyze the changes in American industry since 1810.

A few weeks after the census began a prediction was made that the returns would be quite unsatisfactory. "The returns will be so imperfect," *Niles Register* of August 26, 1820, surmised, "that it will have been better if the subject of the inquiry had been altogether omitted." Three valid reasons were suggested for the apparent failure of the census: (1) the enumerators were unqualified to gather data; (2) they were reluctant to return to establishments where the proprietor had been absent at the time of the first visit; and (3) the entrepreneurs were unable to answer the questions accurately.

Adams' *Digest of Manufactures*<sup>33</sup> shows that the doleful prediction was, if anything, an understatement of the degree of inaccuracy in the returns. Several Congressmen complained because no returns were included for their districts.<sup>34</sup> The Department of State therefore prepared a supplement that contained tabulations of returns received after the *Digest* was compiled.<sup>35</sup>

Even with the supplement, the tabulations of the census of manufactures were grossly incomplete. Not only were marshals and their deputies negligent of their census duties, but the State Department clerks failed to tabulate many returns. The returns for Hanover, Patrick, and Stafford Counties, Virginia, now among the remains of the 1820 census, were omitted from the *Digest*.<sup>36</sup> The deputy marshal for Sampson County, North Carolina, enumerated cotton gins and gristmills and sawmills; but, because he supplied no details about their operations, no mention was made of them in the *Digest*. Although scattered returns were received from Jones, Carteret, and Wake Counties, North Carolina, none were tabulated. Of the returns for South Carolina, only three have been

<sup>33</sup> *American State Papers, Finance*, Vol. 4, pp. 28-223.

<sup>34</sup> *Annals of Congress*, 17th Cong., 2d sess., pp. 887-901.

<sup>35</sup> *American State Papers, Finance*, Vol. 4, pp. 291-299.

<sup>36</sup> The original schedules, with many gaps, are available in the National Archives (RG 29). Name and industry indexes are also available.

located, and none were tabulated. Similarly, returns for Somerset County, Maine, were omitted from the report.

One of many reasons for incomplete schedules was the reluctance of certain manufacturers to supply data. Some of them entered their objections directly on the schedules; in other cases the deputy marshals noted that the proprietors were either fearful of taxation or angry at the invasion of their privacy.<sup>37</sup>

The extant original schedules have, for reasons shown above, considerable unexploited data or data incorrectly transcribed. The returns for Allegany County, Maryland, for example, show three producers of leather goods; but the *Digest* gives only the data for one firm with the exception of the column for recording the value of goods produced. Retabulating all the returns would doubtless reveal many more errors. Replies to the last question about financial conditions of the firms could not, of course, be tabulated; hence, Adams or his clerk merely summarized the comments in a few words. Often, however, the report for a county contains a brief abstract of the remarks by a single firm in the industry. While the report is therefore of quite limited value, it, together with the original schedules, could supply useful data concerning manufacturing enterprises.

Because Congress and the executive branch were dissatisfied with the 1820 census of manufactures, the 1830 census was limited to an enumeration of the population. In 1838, however, President Martin Van Buren and several Congressmen proposed that economic data be collected during the next census.<sup>38</sup> Archibald Russell, a New York philanthropist, seized on the suggestion to propose several reforms in census methods, with particular reference to economic and social data. He recommended that the census of manufactures be broadened to include farms and mines. To simplify census procedures, Russell also recommended that the schedule should require only quantitative data.<sup>39</sup> The census act of March 3, 1839 (5 Stat. 336), in the light of Russell's recommendations, provided for the collection of data covering agriculture, commerce, manufactures, and schools. The problem of how to collect these data was ignored.

Secretary of State John Forsythe apparently had little interest in statistics. Even the expedient of seeking the aid of the recently organized American Statistical Society (now Association) was neglected. To simplify the task, the Secretary limited the schedule to columns for aggregates of data collected for each industry within an enumeration district. Columns were provided for labor force, production, and investment data. Forsythe felt that omission of the names of companies would overcome the deficiencies resulting from refusal to supply

<sup>37</sup> See, for example, 1820 manufacturing schedules, Rhode Island document 69, New Jersey document 169, Pennsylvania document 562, and Virginia document 152, NA, RG 29.

<sup>38</sup> Fishbein, *Early Business Statistical Operations of the Federal Government*, p. 21.

<sup>39</sup> *Ibid.*, p. 17-18; and Archibald Russell, *Principles of Statistical Inquiries*, pp. 2, 9 (New York, 1839).

private data.<sup>40</sup> The enumerators were not instructed about the method of collecting data from individual firms. Probably the deputy marshals took notes on scrap paper and then entered the totals on the printed forms.

The task of preparing the report for the 1840 census apparently fell to William A. Weaver, a former naval officer.<sup>41</sup> Tabulation of the returns was no hardship to the State Department. The marshal submitted county aggregates for the deputies under his supervision. The departmental clerk, probably Weaver, merely transcribed the data; nevertheless, the report for 1840 was not much of an improvement over the report for 1820. One obvious reason was still the ignorance of the marshals and their assistants concerning industrial establishments. This ignorance was compounded by their assignment to collect for the first time agricultural, commercial, and mining data. Another weakness resulted from inadequate procedures. The report lists for Anne Arundel County, Maryland, four furnaces producing 3,800 tons of cast iron. This figure was correctly transcribed from the marshal's abstract. Turning to the deputy marshal's figures, however, we learn that "3800 tons" applies to only three furnaces as the production data for the fourth are missing.<sup>42</sup> An examination of the few schedules for Allegany County, Maryland, reveals these errors:

- (1) The report shows 74 mills of various types; the schedules show 116. This error was apparently the result of the marshal skipping two pages of the schedules.
- (2) The capital invested in these mills appears in the report as \$50,574. The schedules, with the data for several firms unreported, show \$62,789.

As in the 1820 report, similar errors can be demonstrated for many other counties.

Francis Bowen, the leading economist during the decades between the Federal period and the Civil War, found the returns so poor that he criticized the Government for even attempting the collection of economic data.<sup>43</sup> Francis Amasa Walker, the most competent and influential American statistician of the 19th century, described the results of the manufacturing censuses for 1820 and

<sup>40</sup> Wright and Hunt, *History and Growth of the United States Census*, p. 145.

<sup>41</sup> Although there is no direct evidence of Weaver's responsibility for the census, his name has been associated with the publication. As Weaver's main function in the Department was the organization of the departmental archives, it seems reasonable to assume that his records experience was put to use in organizing and tabulating the returns received from marshals. See Carl L. Lokke, "The Continental Congress Papers, Their History, 1789-1952," *National Archives Accessions*, No. 51, pp. 8-10 (June 1954).

<sup>42</sup> Department of State, *Compendium of the Census of the Inhabitants and Statistics of the United States as Obtained from the Sixth Census*, p. 138 (Washington, Blair and Reeves, 1841); and "Statistics for the Sixth Census," Vol. 10 of the 1840 special census schedules, NA, RG 29.

<sup>43</sup> Joseph Dorfman, *The Economic Mind in American Civilization*, 2:842 (New York, 1946).

1840 as "worthy of little consideration."<sup>44</sup> A decade later another leading statistician commented as follows:

The census of 1840 was little better than its predecessors. "We are astonished as well as embarrassed," says Mr. [J. Leander] Bishop, "by the meagerness of its details. Even of the leading branches in some instances only the capital is given; in others only the product; and we confess we do not know by what rule of arithmetic or measurement any one could have calculated from official data that the capital invested in manufactures at that time was \$267,726,579." The report itself does not attempt to aggregate the value of the products returned; in a number of the leading industries, such as flour and grist mills, cast iron, liquors, powder, etc., only the quantities are returned; when we come to cast up the account for ourselves, making our own estimates, we find the aggregate so relatively small that we suspect it affords the explanation of the absence of any attempt at an official total.<sup>45</sup>

#### THE CENSUSES OF 1850-70

Congress, to its credit, recognized that its failure to provide adequate legislative guidance for the 1840 census was a cause of the deficiencies in the report. On March 3, 1849, it therefore established the Census Board, comprising the Secretary of State, the Attorney General, the Postmaster General, and a secretary, to prepare and print forms for the collection of data concerning population, mines, agriculture, commerce, manufactures, education, and other subjects (9 Stat. 402). The schedules prepared by the Board were to contain no more than 100 inquiries.

As is common with such organizations, the work of the Board was left to its secretary, Joseph Camp Griffith Kennedy.<sup>46</sup> Although Kennedy's earlier career—ownership of two unsuccessful Pennsylvania newspapers—showed no particular interest in statistics, he became an authority on the subject during the year in which he served the Board.<sup>47</sup>

Soon after establishment of the Board Kennedy proposed that the industrial enumeration be limited to the important industries in each State. This plan would require schedules tailored to the economy of the various States. The chief opposition to Kennedy's proposal came from J. D. B. De Bow, then head of the Louisiana Bureau of Statistics. De Bow cogently argued that the data

<sup>44</sup> *Encyclopedia Britannica*, Vol. 13 (9th ed., Boston, 1888), p. 824.

<sup>45</sup> S. N. D. North, "Manufactures in the Federal Census," p. 260.

<sup>46</sup> No references to the Board's activities appear among the records of the three members in the National Archives.

<sup>47</sup> Paul J. Fitzpatrick, "Leading American Statisticians of the Nineteenth Century, II," *American Statistical Association Journal*, Vol. 53 (Sept. 1958), pp. 693-694.

concerning minor industries could, "if taken together, swell into an enormous aggregate."<sup>48</sup> Kennedy abandoned his proposal.

After consulting with most of the leading statisticians in the country—Edward Jarvis, Archibald Russell, Edwin Chadwick, and others—Kennedy prepared six schedules and the related instructions to marshals.<sup>49</sup> Although the results of their combined efforts were a vast improvement over earlier techniques, Congress, apparently dissatisfied with Kennedy's progress, also made plans for the census. The type of paper to be used for the census schedules, their content, and the problems of tabulation were debated in the Senate.<sup>50</sup> Congress did not therefore pass a census act until the latter part of March. Under the circumstances, the act (9 Stat. 428) was detailed and comprehensive. It provided for a superintending clerk—later known as Superintendent of the Census—to supervise the census under the direction of the Secretary of the Interior, detailed the procedures for taking the census, and described the contents of the schedules.

These schedules differed only slightly from those compiled by Kennedy. Schedule No. 5, "Products of Industry," contained blanks for identifying the firm and the type of business and for entering answers to 14 inquiries regarding capitalization, raw materials, kind of motive power, the labor force, wages, and the annual product. The quantity, kind, and value of both raw materials and goods produced were to be given. All "productive" industries, except household manufactures and firms producing less than \$500 worth of goods, were to be included in the census.

Two other reforms were included in the act. Congress authorized payment to the enumerator of 15 cents for each firm reported and provided a penalty for refusal by households, farms, and industrial establishments to supply data. Although these reforms resulted in a higher percentage of returns, they were still not complete. Benjamin Peirce, Superintendent of the U.S. Coast Survey, calculated that the system of compensation to enumerators was "radically defective and vicious."<sup>51</sup> Since enumerators in sparsely settled areas usually suffer most from inequitable compensation systems, it is probable that many of them did not go out of their way to collect an extra 15 cents for gathering detailed company data.

As Kennedy had prepared instructions for the census in January 1850, he did not have to face that task in the short time between the passage of the act and the beginning of the enumeration on June 1.<sup>52</sup> His instructions resulted in greater accuracy in the returns. One significant innovation was an explanation

<sup>48</sup> Fishbein, *Early Business Statistical Operations of the Federal Government*, p. 24.

<sup>49</sup> Census Office, Seventh Census, *Statistical View of the United States . . . Being a Compendium of the Census*, pp. 12–13 (Washington, 1854).

<sup>50</sup> *Congressional Globe*, 31st Cong., 1st sess., pp. 283, 288, 687, 690.

<sup>51</sup> Census Office, Ninth Census, *The Statistics of the Population of the United States*, Vol. 1 (Washington, 1872), xxvi.

<sup>52</sup> Letters, Joseph C. G. Kennedy to the Secretary of the Interior, January 1 and 14, 1850, File 183, Records of the Patents and Miscellaneous Division, Department of the Interior, RG 48, NA.

of each of the inquiries, such as this explanation for the question concerning power:

Under heading 7, entitled "*Kind of motive power, machinery, structure, or resource*," is to be inserted, first, in regard to *motive power*, as water, steam, horse, wind, or otherwise, as the fact may be; second, in regard to machinery, the number of spindles, looms, power printing presses, mills, and runs of stones, sawmills, number of saws, or other appropriate amount of the quantity and kind of machinery; third, in regard to other kinds of *structure* or *resource*, as furnaces, number of fires; bloomeries, number of fires; stone quarries, mines of any kind, ships, vessels, or boats used for fishing, etc.<sup>53</sup>

Another innovation concerned the confidentiality of business data. As has been shown, the reluctance to supply data was one of numerous reasons for the incompleteness of returns. Kennedy handled this problem competently by the following instruction:

Should any one object on the ground of not wishing to expose the nature of his business, the assistant marshal would state that it is not desired to elicit any information which will be used or published as concerning the operations of any individual or concern. The individual facts are confidentially imparted and received, and will only be published, if at all, in connection with and as part of a great body of similar facts, from which it will be impossible to abstract or distinguish those of individual firms or corporations.<sup>54</sup>

When reports reached Kennedy that many enumerators ignored his instruction concerning confidentiality, he informed the marshals, "No individual employed under sanction of the Government . . . has a right to promulgate or expose [the schedule] without authority."<sup>55</sup> As the 1820 census practice of giving the schedule to the entrepreneur or the manager proved unsatisfactory, Kennedy decided to assign the task of completing the industrial schedules to the enumerators with the aid of the proprietor.

To these improvements in methods of collecting data should be added an improvement in the tabulating process. The clerks placed a check mark next to the name of each firm as its data were tabulated.

An examination of the Maryland schedules shows that only establishments that were not to be included in the enumeration—those with a value of production of less than \$500—were not checked.<sup>56</sup> This practice and the greater care

<sup>53</sup> Wright and Hunt, *History and Growth of the United States Census*, p. 313.

<sup>54</sup> *Ibid.*, p. 312.

<sup>55</sup> *Ibid.*, p. 150.

<sup>56</sup> The Maryland schedules, 1850–80, are in the Law Library of the State at Annapolis. The Census Bureau, in 1918, transferred the 1850–80 schedules for industry, agriculture, mortality, and social statistics to the respective States or to historical and educational institutions. The National Archives is now obtaining microfilm copies of these schedules.

taken in totaling the data resulted in an accurate tabulation of the schedules. A check of several counties among the Maryland schedules did not disclose a single error.

All of these methodological reforms were reflected in a vastly improved report concerning industry. The chief deficiency in the report, other than the errors resulting from inadequate and improper enumeration, lies in the limitations placed on its scope. Kennedy's *Digest of the Statistics of Manufactures* contains tabulations of the principal and other industries by State, a general summary of manufactures by industry, and aggregates of the statistics. He included no commentary about the data, apparently expecting to include additional information in later volumes, but he was discharged for political reasons before he was able to compile any more reports.<sup>57</sup> J. D. B. De Bow, publisher of *De Bow's Review* and author of a three-volume statistical, historical, and economic encyclopedia on the South and West, replaced him.

The major report on the 1850 census was therefore prepared by De Bow in 1853. It contained a history of the census and a brief description of the techniques used in conducting it. The remainder of the report consisted of aggregates of the demographic, industrial, institutional, and other data obtained from the six schedules. De Bow left office in 1855 before he could complete the volume devoted exclusively to manufactures. Kennedy was reappointed by his fellow Pennsylvanian, President James Buchanan, to complete the final volume. His *Digest of Manufactures: 1850* by no means exhausted the data contained in the schedules, which are now scattered among numerous State and historical agencies. Only the quantitative data were summarized. Data about the types of products, raw materials, and machinery were omitted.

Kennedy was deservedly the choice for Superintendent of the 1860 census. The act of 1850, much of which enacted Kennedy's proposals, was left unchanged for the succeeding census. There was therefore no significant change in the procedures for gathering, tabulating, or publishing the industrial data for the 1860 census.

It should be noted, however, that the reports for 1860 were less accurate than those for 1850. By the time the data were being tabulated for publication, the Civil War had already created a shortage of clerks. The inadequate and inexperienced staff apparently did not take the time to check their figures for accuracy. In Frederick County, Maryland, for example, a lone photographer reported that he had invested \$220 in his establishment and that he produced 500 pictures valued at \$600. The report shows two photographers with capitalization of \$720—possibly an addition of the capital and the number of pictures—and a value of production of \$2,600.

Such errors were not limited to Maryland schedules. Francis Amasa Walker estimated that "not two-thirds of the true industrial production of the country were embraced in the enumeration of 1860."<sup>58</sup> A recent comparison of the indi-

<sup>57</sup> See Fishbein, *Early Business Statistical Operations of the Federal Government*, p. 26.

<sup>58</sup> Francis A. Walker, *Discussions in Economics and Statistics*, Vol. 2 (New York, 1899), p. 4.

vidual returns for Charleston, South Carolina, with the data in the published report and in newspapers showed wide discrepancies among the three sources.<sup>59</sup>

Kennedy, probably unaware of the errors made by his enumerators and clerks, felt that he had achieved a high degree of accuracy. His first report—*Preliminary Report on the Eighth Census* (Washington, 1862)—referred to his profession as the "statistical science." To demonstrate the potentials of this new science, he analyzed population trends and explained economic growth. Superintendent Kennedy estimated, for example, that a third of the population was directly or indirectly supported by manufacturing and stated that no statistics were more important than those relating to "the productive capacities [of the population] in the automatic and handicraft arts."<sup>60</sup> Kennedy's report contains generally valid analyses of growth in a number of industries, particularly textiles, fuel, and machinery production. He was so impressed with the rapid expansion of manufacturing and so materialistic in outlook that he wrote: "The statistics of looms, spindles, and factories, of furnaces and forges, of steam-engines and sewing-machines, and of a thousand other instruments of creative industry, become the representatives of almost every form of national and individual happiness, exertion, aspiration, and power."<sup>61</sup>

If Kennedy had remained Superintendent until all the reports were completed, he might have compiled a personal product of considerable interest and merit. His office was unfortunately abolished before he completed his task, and the responsibility for preparing the census reports was transferred to the General Land Office. Commissioner J. M. Edmunds found time from his regular duties to turn out reports that followed Kennedy's general plan. Edmunds' publication *Manufactures of the United States in 1860* contains analyses of industrial development similar to those in Kennedy's report. Of special interest to industrial historians are Edmunds' description of the boot and shoe industry and his comments about the development of the rubber goods industry.

Kennedy hoped to become Superintendent for the 1870 census, but a better statistician, Francis Amasa Walker, was available in 1869 when Congress was considering census legislation. Brigadier General Walker was then the Director of the Bureau of Statistics, Treasury Department, after an honorable Civil War career and service as editor of a distinguished newspaper, the *Springfield (Mass.) Republican*.

The chairman of the House Committee on the Ninth Census, James A. Garfield, was a friend of Walker. Both of them favored a complete revision of census legislation to broaden the scope of the census, to develop special schedules for important industries, and to employ experts instead of marshals to supervise the collection of economic data. Garfield's attempt to obtain new legislation failed, but he was somewhat repaid for his efforts when Walker was

<sup>59</sup> Ernest M. Lander, Jr., "Charleston: Manufacturing Center of the Old South," *Journal of Southern History*, Vol. 26 (Aug. 1960), p. 330.

<sup>60</sup> Census Office, Eighth Census, *Preliminary Report on the Eighth Census*, p. 59 (*H. Ex. Doc.* 116, 37th Cong., 2d sess.).

<sup>61</sup> *Ibid.*, p. 60.

appointed to the superintendency on February 7, 1870.<sup>62</sup> Walker's studies in economics, his experience in gathering foreign trade statistics, and the Congressional debate on census legislation provided him with the tools for developing a professional statistical system that was to make the United States a leader in the field of industrial statistics in the 19th century.

Although the changes he could make in census procedures were limited by the 1850 act, Walker made a number of improvements without legislative sanction. With the U.S. marshals still in control over enumerators, he could do little about standards for their appointment and training. The tabulators in Washington, however, were under the direct supervision of his chief clerk, Charles W. Seaton, a statistician of note. To raise standards for the clerical staff, Walker required that applicants must pass a written examination as a prerequisite to appointment.

Walker wished to eliminate the collection of data on capitalization. Since the legislation required collection of these data, however, he compiled the tabulation while warning the user that they were "untrustworthy and delusive." "No man in business," Walker wrote, "knows what he is worth—far less can say what portion of his estate is to be treated as capital."<sup>63</sup>

He also rationalized the classification of industries and occupations on the lists he sent to enumerators with his general instructions. The number of occupations was reduced from 584 in 1860 to 338, and extractive industries were not included under manufactures. Although he was able to separate metal mining from fabrication, the schedule provided by law did not permit him to separate mining from smelting.

Because of his own interest in machinery and productivity, Walker added to the industrial census schedule places for entering detailed data concerning motive power, kinds of machinery, and the length of time plants had been in operation. To provide a more thorough coverage of industrial development, he instructed enumerators to collect data from jobbers and repairers and to collect occupational data from employees over 10 years of age.

Walker's knowledge about American industry enabled him to recognize gross inaccuracies or omissions in the schedules received. As the enumerators still were paid only 15 cents for each schedule, they were naturally reluctant to visit any establishment more than once. Walker therefore obtained funds to permit a canvass of a number of industrial centers, thus adding about \$250,000 to the value of goods produced.<sup>64</sup> His knowledge of money and prices—a subject in which he was a leading authority—also resulted in an advance in statistical techniques. In comparing data for 1860 with those for 1870, Walker took into account changes in the value of the dollar and other factors making for a lack of comparability. In his judgment the value of pro-

<sup>62</sup> Amendments of 1870 and 1871 (16 Stat. 118, 514) to the act of 1850 related chiefly to compensation for enumerators.

<sup>63</sup> Census Office, Ninth Census, *The Statistics of the Wealth and Industry of the United States* (Washington, 1872), p. 381.

<sup>64</sup> S. N. D. North, "Manufactures in the Federal Census," p. 261.

duction increased about 52 percent although the reports showed an increase of 108 percent.<sup>65</sup>

Despite all his efforts Walker recognized that his census report on industry was by no means complete. He enumerated the chief weaknesses thus: (1) the use of untrained assistant marshals, (2) their lack of technological intelligence, (3) their lack of interest in manufactures, (4) inadequate pay, (5) the temporary absence of proprietors, (6) the trend toward the separation of the administrative office from the factory site, (7) the elimination of all firms producing less than \$500, and (8) the failure of proprietors to supply data required by the schedule.<sup>66</sup>

A comparison of the report with the schedules shows that the returns were tabulated with unprecedented accuracy. Use of the schedules is nevertheless rewarding because of their untabulated data, such as descriptions of machinery and the number of months a plant was in operation during the previous year, and their data about the exact location of establishments.

#### THE CENSUSES OF 1880 AND 1890

Passage of a completely revised act providing for the tenth census seemed assured after the publication of the 1870 census reports. In January 1878, Walker, who was still serving as Superintendent without compensation, again urged Congress to authorize the appointment of specialists for the collection of census statistics and to give considerable autonomy to the Superintendent in preparing forms and planning the content of reports.<sup>67</sup> Three months later the Senate and the House passed resolutions for the appointment of select committees to draft legislation. The two committees met jointly to listen to Walker's testimony. He offered four main proposals: (1) the form of inquiry should be left to the discretion of the Census Office; (2) specially appointed experts, rather than law enforcement officers, should superintend the census; (3) enumerators of population should also gather data on agriculture; and (4) manufacturing data should be collected by "the best men who could be found," in each branch of industry.

In his testimony, Walker dealt at some length with the problem of gathering industrial data. He asserted that certain firms, such as gristmills and sawmills and blacksmith shops, could be handled by household enumerators, whereas collectors of data about iron, steel, textile, and glass firms should be experts in the respective industries. Unless experts were used, Walker explained, the collection data would be inaccurate and many firms—particularly those in

<sup>65</sup> Census Office, Ninth Census, *The Statistics of the Wealth and Industry of the United States*, pp. 377-379.

<sup>66</sup> *Ibid.*, pp. 372-374, 386.

<sup>67</sup> Walker's recommendations appear in the *Annual Report of the Secretary of the Interior*, Nov. 1878.

basements—would be neglected. The ordinary enumerator would, in addition, be unable to deal with the problem of gathering data from firms in which the factory and the administrative staff, with the books, were in separate localities.

Under the terms of the census act of March 3, 1879 (20 Stat. 437), responsibility for the tenth census was delegated to a superintendent under the general direction of the Secretary of the Interior. Enumerators, special agents, and experts, rather than marshals, were to gather data. With regard to industrial statistics, the act provided for the preparation, under the superintendent's direction, of a general schedule for manufactures, special schedules for important industries, and detailed questionnaires for the collection of data on railroad, express, telephone, telegraph, and insurance companies. The act thus embodied Walker's four chief recommendations. Joseph C. G. Kennedy was one of the few persons who opposed Walker's appointment to administer the tenth census.

Well in advance of the passage of the census act, Walker had mapped his strategy for a comprehensive inventory of the Nation. The industrial reports were to be grouped into several main classifications, namely, agricultural processing, mining (including petroleum), transportation and communication, manufacturing, and power and machinery. Additional industrial data were to be collected about wages and prices, labor disputes, occupational classification of the population, "social" (demographic, economic, and sociological) statistics of cities, Alaskan industries, and extractive industries other than mining (agriculture, ice harvesting, and timber resources).

This grand plan could not succeed without the assistance of a highly qualified professional staff. Colonel Seaton remained as Chief Clerk, and the job of supervising the collection of industrial statistics was placed in the hands of such well-known specialists as Spencer F. Baird, Clarence King, Raphael Pumpelly, William F. Trowbridge, Edward Atkinson, John Wesley Powell, and James M. Swank.<sup>68</sup>

After being briefed about their roles in the census—supervising the enumerators and preparing detailed reports about specific subjects—the experts and special agents were left largely to their own devices. At least one expert, Pumpelly, was permitted to take the schedules to his home for review. By November 3, 1881, when Walker resigned to become President of the Massachusetts Institute of Technology, the census operation was proceeding with remarkable efficiency. Although he was succeeded by Charles W. Seaton, Walker remained the defacto director of the census. Seaton, who concerned himself chiefly with the supervision of clerical operations and the demographic studies, died in 1885, apparently from overwork.

The first statistical report for the census—with the exception of special, interim bulletins—was the two-volume *Compendium* transmitted by Seaton to the Secretary of the Interior on January 6, 1883. The first volume contained demographic and agricultural statistics; the second, quantitative data relating to manufacturing, transportation, insurance, valuation of real estate, public indebt-

<sup>68</sup> Only two of the "experts" and "special agents" who assisted Walker do not appear in the *Dictionary of American Biography*.

edness and taxation, newspapers and periodicals, and sociological phenomena. The industrial data were tabulated by State and industry, with additional tabulations relating to 20 principal cities. The data consisted of the number of establishments, amount of capital, number of employees, and value of raw materials and fabricated products. The second volume also contained data on the use of steam and water power and financial statements of individual telephone, telegraph, transportation, and insurance companies.

The *Compendium* was in the nature of a preliminary report of the Census Office. The final report consisted of 22 large volumes and contained the detailed findings of Walker and his staff. Most of the volumes—relating to population, agriculture, transportation, vital statistics, industrial power, manufacturing, mining, labor economics, and urban development—contained numerous monographs in narrative form, with many statistical tabulations. Each of these volumes and some of the monographs deserve individual analysis. Because this critique deals chiefly with manufactures, the most detailed attention will be devoted to the 1198-page volume, plus an introduction, on this branch of industry.<sup>69</sup>

Walker began the introduction to the volume with a brief description of his method of collecting data and ended it with an answer to criticism of some of the data as well as to charges that census reports concerning industry were a "sham." Walker's answer, simply stated, was that he made no pretense that his reports were absolutely accurate. He asked, quite reasonably, that the data in them be examined carefully and judged on their merits.

The introduction contained, in addition, a brief summary of the development of manufacturing during the years 1850–80. (Walker apparently dismissed the earlier data as worthless.) To the general statistics concerning manufacturing enterprises, Walker added his own thoughtful comments. He noted, for example, that bakery products were not reported for all States and territories. The omission of two areas (New Mexico and Wyoming) meant not that the inhabitants sold no baked goods but more likely that baking was not performed in specialized establishments.<sup>70</sup> In this connection, he called attention to the importance of studies about the location of industries, with particular reference to the growth of manufacturing centers. He was one of the first American economists to point out the change in the role of the cities from mercantile to industrial centers. Walker also compiled summary statistics on capital and labor resources, with brief comments about their significance.

Of the remainder of the volume, about one-third is devoted to tabulations of quantitative data by State, industry, and city. A comparison of the schedules for Maryland with the tabulations shows that great pains were taken to achieve an accurate tabulation of the data in the schedules. The limitation in

<sup>69</sup> Census Office, Tenth Census, *Report on the Manufactures of the United States* (Washington, 1883).

<sup>70</sup> We must also recognize that the West, particularly the Southwest, was not as thoroughly enumerated as the East. Walker did not consider the West important in the American economy. See Ward Thoron, ed., *The Letters of Mrs. Henry Adams* (Boston, 1936), pp. 248–249.

the report rests in the fact that, as in previous reports, all the data collected were not tabulated.

The unique features of the *Report on the Manufactures* are the several industrial histories, the chronicles of the use of power, and the analysis of the development of the factory system. As mentioned above, the authors were truly experts in their subjects. Edward Atkinson, who prepared the study of cotton textiles, was an officer in several mills as well as an inventor and a leading exponent of laissez-faire.<sup>71</sup> The study of interchangeable parts by Charles H. Fitch, a graduate of the Sheffield Scientific School at Yale, is a work of considerable competence. Its chief weakness as a source is its lack of citations. Where did Fitch learn, for example, of the French experiments in interchangeable parts in 1717? The author did not neglect, as do some later historians, the important contributions of Eli Whitney's contemporaries Simeon North, John Hall, and several others. The report has historical and technological data concerning the manufacture of firearms, ammunition, sewing machines, and agricultural implements. The treatment is not definitive by any means, but it is far from superficial.

The report by Carroll D. Wright, one of the leading American statisticians of the 19th and early 20th centuries, concerning the factor system was a meritorious achievement. Superintendent Walker instructed Wright to include in his history a description of the origin and development of the system in Great Britain. Although Wright had high praise for the factory system as a method of production and considered it an improvement, from the workers' viewpoint, over the domestic system, he was aware of the social problems the newer system created. He noted, for example, benefits derived from factory legislation to outlaw working conditions that were injurious to the health of employees. Wright concluded, however, that the factory system would eventually improve working conditions and increase wages of the workers.

In addition to the historical narrative on the factory system, Wright compiled data on infant mortality in factory towns, agricultural areas, and diversified cities; the air space for each worker in various industrial establishments; and wages. These data and the historical essay give a broad and reasonably accurate picture of the factory system during the post-Civil War period.

Each of the reports on industries in this volume and subsequent volumes was usually an individual effort by the author within the general frame outlined by Walker; therefore, each should be individually analyzed. For the sake of brevity, however, only the report concerning the "Statistics of the Iron and Steel Products of the United States," by Special Agent James M. Swank is examined in some detail. The structure of the monograph is fairly typical of the other industrial reports although the narrative was entirely Swank's product.

The author faced the task of preparing an analysis of the iron and steel industry with a knowledge probably equaled by few in this country. He was Secretary—and the skilled publicist and lobbyist—of the American Iron and

<sup>71</sup> See Howard F. Williamson, *Edward Atkinson, the Biography of an American Liberal, 1827-1905* (Boston, 1934).

Steel Association. To his own sources for data, he added the census questionnaires completed for the individual members of the industry. The schedules for blast furnaces—Special Schedule C—requested the name and location of the firm, the value of buildings and machinery, the number of employees and their hours of labor and wages, daily capacity of the plant, data about each raw material, value of jobbing and repairing work, the number of months the plant was in operation during the previous year, and information about strikes.

The schedules for rolling mills, Bessemer and open hearth steel works, other steel plants, and bloomeries and forges (Special Schedules D, E, F, and G and Supplemental Schedule for Forges, Foundaries, etc.) requested, in addition to most of the data on Schedule C, the number of rolls and hammers and the value of each finished product, for example, bar iron, car axles, rails, sheet iron, blooms, and Bessemer steel ingots. Each firm answered more than 30 inquiries.

The first section of Swank's report contained statistical tabulations of production, cost, and realization data; information about the geographical distribution of the industry; and comments about the size of the industry in various States. The narrative section ends with a statement typical of a publicist (p. 745): "The census year 1880 will be memorable as a year of general prosperity for our iron and steel industries, and as one which witnessed the beginning and the end of the most exciting epoch in their history." This passage is followed by several statistical maps that contain an excellent graphic illustration of the industries.

The remainder and largest part of Swank's report was devoted to a history of the iron and steel industry. His sources for the pre-19th-century history included the Bible, Homer, Virgil, Samuel Smiles' *Industrial Biography* (1876), Andrew Yarranton's *England's Improvements by Sea and Land* (1676), James E. T. Rogers' *History of Agriculture and Prices in England* (1862-1902), Harry Scrivenor's *History of the Iron Trade* (1854), and John Houghton's *Husbandry and Trade Improved* (1727).

Swank's treatment of the early history of iron production was somewhat superficial. Other than the references to sources, the most notable feature of his study was its technological data, many of which were obtained from a professor at the Stockholm School of Mines, who in turn had based his comments largely on Emanuel Swedenborg's *De Ferro* (1734) and Christopher Polhem's *Patriotiska Testamente* (1761).

The last part of Swank's essay, which was a study of the American iron and steel industry, was neither superficial nor definitive. It was at the time the best single source for historical data, being a synthesis of available information. A list of some of his sources suggests the value of Swank's contribution, namely, J. Leander Bishop's *History of American Manufactures*, J. Peter Lesley's *Iron Manufacturer's Guide* (1859), Edward Johnson's *Wonder Working Providence* (1651), James Torrey's *History of Scituate* (1815), colonial and State histories, almanacs, manuscripts, and trade journals.

Although Swank was objective in presenting his data concerning the indus-

try, some remarks reflected his interest in promoting the industrialists' views. In a section dealing with factors that inhibited the growth of the iron and steel industry, Swank mentioned high wages, the restrictions placed on the industry during the colonial period, and low tariffs (pages 873-879); nevertheless, he pointed with pride to the high production in such firms as the Edgar Thomson Steel Works, Laughlin and Company, and the Cambria Iron Company. Swank concluded:

Although this country can not produce iron and steel as cheaply as European countries which possess the advantages of cheap labor and proximity of raw materials, it is not excelled by any other country in the skill which it displays or the mechanical and scientific economies which it practices in any branch of their manufacture, while in certain leading branches it has displayed superior skill and shown superior aptitude for economical improvements. Our blast-furnaces practice is the best in the world, and it is so chiefly because we use powerful blowing-engines and the best hot-blast stoves, possess good fuel, and carefully select our ores. The excellent quality of our pig iron is universally conceded. Our Bessemer steel practice is also the best in the world. We produce much more Bessemer steel and roll more Bessemer steel rails in a given time by a given amount of machinery, technically termed a "plant," than any of our European rivals.

Swank's report may be neglected by historians because he used it as the basis for his privately published *History of the Manufacture of Iron in All Ages* (1889);<sup>72</sup> yet most of the other industrial reports are also neglected. One recent exception is Warren Scoville's high praise for the "Report on the Manufacture of Glass" by Special Agent Joseph D. Weeks.<sup>73</sup> Weeks also prepared the entire volume devoted to reports concerning wages, labor relations, and consumer prices. To gather these data he developed a sampling technique, which, unfortunately, is inadequately described to permit an evaluation of his findings. His description of the method he employed to collect wage rates follows:

In collecting these statistics no attempt was made to procure returns from all establishments, or even a great number of establishments engaged in each industry reported upon. It was deemed best to select in each branch of business those works, in the several sections of the country, which might be regarded as typical establishments, and to secure the most complete and accurate returns practicable from these. In deciding upon the establishments from which returns should

<sup>72</sup> Swank's study of the industry in 1880 is more substantial than the study on steel by H. R. Schubert in Charles Singer's *History of Technology: The Late Nineteenth Century*, Vol. 5 (Oxford, 1958), pp. 53-77.

<sup>73</sup> *Revolution in Glassmaking: Entrepreneurship and Technological Change in the American Industry, 1880-1920* (Cambridge, Mass., 1948), p. 11.

be asked, reference was had to the age, standing, productive capacity, and general reputation of individual firms and corporations.<sup>74</sup>

Weeks corresponded with persons in various industries of the country to ask for lists of firms that should be canvassed for data. The returns for the several firms in each industry were not comparable and had to be edited by Weeks before they could be tabulated. Walker nevertheless insisted that the wage data, while not free from error, were as accurate as could be expected in this type of inquiry.<sup>75</sup>

In his report on strikes and lockouts—based on schedules distributed to the conflicting parties to disputes reported in the press—Weeks implied a belief, in common with Walker, in the justice of the judgment and decisions made by successful entrepreneurs.<sup>76</sup> "Most employers," Walker wrote, "hesitate to declare a lockout or resist a demand which may lead to a strike, without using every effort to prevent such action, and take the decisive step only when their honest judgment tells them that their industrial existence or prosperity depends upon securing their own demands or resisting those of their employes."<sup>77</sup>

The questionnaire requested data on the name and location of the plant, cause of the strike or lockout, cost in wages, the number of employees involved, and the result of the conflict. Most of the returns, it should be noted, came only from one side of the disputes—the employers.<sup>78</sup>

The volumes containing the long and detailed reports relating to the extractive and processing industries deserve more analyses than this brief paper can supply. Reports that relate to flour milling and dairying are similar to the reports about manufactures. Studies of the mining industries (including petroleum), prepared under Clarence King's direction, contain technological, cost, and employment data.

Inquiries on the transportation and communication industry had not been included in the census before 1880. Walker had had a long-standing interest in transportation and probably contributed much of his time to preparing schedules for the 1880 study.<sup>79</sup> Because of his interest and the fact that the reports on transportation and communication were pioneer works, they have a prominent place among American statistical studies. The reports on railroads, it should be recalled, were prepared near the beginning of the period of large-scale consolidations and a few years before equipment was standardized. They

<sup>74</sup> Census Office, Tenth Census, *Report on the Statistics of Wages in Manufacturing Industries, With Supplementary Reports* (Washington, 1886), p. ix.

<sup>75</sup> *Ibid.*, pp. x, xv.

<sup>76</sup> For a review of Walker's business theories, see Sidney Fine, *Laissez-Faire and the General-Welfare State; a Study of Conflict in American Thought, 1865-1901* (Ann Arbor, Mich., 1956), pp. 73-79.

<sup>77</sup> Joseph D. Weeks, "A Report on Strikes and Lockouts Occurring Within the United States During the Calendar Year 1880," p. 1, in Census Office, Tenth Census, *Report on the Statistics of Wages in Manufacturing Industries With Supplementary Reports*.

<sup>78</sup> *Ibid.*, p. 3.

<sup>79</sup> Henry Holt, *Garrulities of an Octogenarian Editor* (Boston, 1923), p. 265.

therefore contained detailed data on a number of lines of less than 50 miles of track; specifications for roadways, tracks, and cross ties; types of rolling stocks; and the average period of durability of steel and iron rails. They also contained financial statements, descriptions of railroads, copies of agreements and contracts between railroad companies, and data on such subjects as labor relations, accidents, and sources of income. Although some of the data were obtained only after legal proceedings, most were supplied on a voluntary basis, presumably because of "the professional pride and patriotic sentiments of the railroad officers."<sup>80</sup> How much the report on railroads contributed toward consolidation and standardization is conjectural, but it is not unreasonable to assume that railroad magnates and their aides made as much use of them as their objectives required.

The reports concerning the use of power and machinery should not be overlooked by industrial historians. Most of them were prepared by Frederick R. Hutton, a professor of engineering at Columbia and later President of the American Society of Mechanical Engineers, and Herman Hollerith, who was to invent the punch card system of tabulation as a result of his experience with the 1880 census.<sup>81</sup>

The reports contained tabulations of the number of water wheels, boilers, and engines used in industry and the amount of horsepower generated. The task of compiling the data was complicated by the fact that many small firms rented steam power from larger establishments or from a steam supply company.

At Walker's suggestion, studies were prepared on the construction of machine tools and wood-working machinery. Hutton found that technological changes were so rapid that his report was practically obsolete by the time it was completed.<sup>82</sup> These studies and the reports on pumps, wool and silk machines, marine engines and steam vessels, and the manufacture of engines and boilers consisted chiefly of technological data together with statistical tabulations of production and costs.

Students, if not specialists, in American industrial history will find the reports of the 1880 census meritorious and suggestive essays. They contain a synthesis of the major publications available on the subject and show with remarkable insight the state of American economy at a time of great technological and social change. The schedules, though incomplete and usually based on educated guesses, were tabulated and analyzed with care and intelligence. When the experts discovered that companies were omitted or errors were made in supplying data, additions and corrections were added to the original schedules

<sup>80</sup> Census Office, *Tenth Census, Report on the Agencies of Transportation in the United States* (Washington, 1883), p. 287.

<sup>81</sup> Herman Hollerith, "The Electrical Tabulating Machine," *Journal of the Royal Statistical Society*, Vol. 57 (Dec. 1894), p. 678.

<sup>82</sup> Letter, F. R. Hutton to W. P. Throwbridge, Dec. 8, 1881, in "Report on Machine Tools and Woodworking Machinery," p. x, in Census Office, *Tenth Census, Report on Power and Machinery* (Washington, 1888).

in red ink.<sup>83</sup> No bibliographies of American economic life should fail to call attention to the best of the numerous reports, particularly those mentioned above.

The relatively high cost of the tenth census and the 8 years required to prepare all the reports resulted in so much criticism that Walker had misgivings about the future of comprehensive national inventories. He therefore prepared a defense of the 1880 census while pleading for the collection of more definitive data. As evidence of the excellence of his reports, Walker cited favorable comments of the leading European statisticians and periodicals, from London and Edinburgh to Vienna, Budapest, and St. Petersburg.<sup>84</sup> Of these reports, Walker listed for particular praise the studies of forestry, water power, and petroleum. "The Tenth Census was," Walker boasted, "more than an enumeration of the population, wealth, and industry. It was a survey of the condition of life, industry, and production, such as cannot fail to be of great value to a rapidly growing nation . . . a work worthy of the nation and the age."<sup>85</sup>

Walker did not expect that the census of 1890 would be as comprehensive as the one he had superintended. He argued instead that the decennial census be limited to population and agriculture. He suggested that after completion of this part of the enumeration the Census Office could use its experienced staff to gather industrial, social, and other statistics. Congress, however, decided to continue the tradition of collecting all census data at the same time. Walker's fear that economic statistics would be eliminated was unfounded.

The census act of 1889 raised the compensation for enumerators, supervisors, and clerks and provided for the collection of data on private and corporate indebtedness (25 Stat. 760). Subsequent legislation authorized the expansion of agricultural statistics and the collection of data from unincorporated as well as incorporated express companies (26 Stat. 13, 313).

President Harrison appointed Robert Percival Porter as Superintendent of the Eleventh Census on April 17, 1889. After a career in journalism, Porter had prepared the reports on wealth, debt, taxation, and transportation for the 1880 census.<sup>86</sup> Although he made many changes in the number and content of the schedules for the 1890 census, Porter followed the methods and general plans developed by Walker. The statistics for wages in 1890 were included in the manufacturing and special schedules rather than in a separate schedule for a limited number of firms.

Porter's schedules for the iron and steel industry were more comprehensive than Walker's. The 1890 census included a schedule for the executive offices of the industry as well as special schedules for blast furnaces, rolling mills, miscel-

<sup>83</sup> Unfortunately for the researcher, the sources of the new and amended data were not noted on the schedules. (This deficiency was not corrected in later censuses.) Although the experts tried to estimate missing data, many of these omissions could not be estimated and were therefore excluded from the published tabulations. The census report does not show the number of firms not reporting.

<sup>84</sup> Walker, "The Eleventh Census of the United States," *Quarterly Journal of Economics*, Vol. 2 (Jan. 1888), p. 143.

<sup>85</sup> *Ibid.*, p. 145.

<sup>86</sup> See Fitzpatrick, "Leading American Statisticians," pp. 695-696.

lanous steel works, and bloomeries and forges. Walker's 33 inquiries concerning Bessemer and open-hearth furnaces were reorganized and expanded to 15 basic questions, with numerous subquestions. The format, with columns for quantitative data, was also improved.

The increase in statistical inquiries and the growth of the Nation resulted in an even larger report than the mammoth study for 1880. Although the preparation of industrial histories was virtually abandoned, Porter and his successor, Commissioner of Labor Carroll Wright, submitted a 25-volume report in addition to the compendium and a statistical atlas. As the schedules were destroyed by fire in 1921, the reports are all that remain for historians and economists.

In considering the quality of these volumes, the effectiveness of Superintendent Porter's instruction to enumerators with regard to industrial statistics should first be examined. Porter called the enumerators' attention to a noteworthy section of the census act of March 1, 1889, which provided that "any supervisor or enumerator who . . . shall, without the authority of the Superintendent, communicate to any person not authorized to receive the same, any information gained by him in the performance of his duties, shall be deemed guilty of a misdemeanor, and upon conviction shall be fined not exceeding five hundred dollars." Porter explained that the intent of this provision was to prevent disclosures of personal data "which would operate to the personal detriment or disadvantage of the person" supplying the information. The "person" included business firms because, as Porter elaborated, no data would be released "concerning the business operations of individual establishments."<sup>87</sup> Assurance as to the confidentiality of company data appeared on each manufacturing schedule.

One of the longest passages in the instructions to enumerators related to occupational statistics. Porter asked the enumerators to identify the occupations properly by the correct nomenclature to distinguish between, for example, nursery laborers and nurserymen, miners and quarrymen, chemists and metallurgists, and glovers and glove dealers.

The general enumerators were instructed to collect data concerning all productive industries except firms in the iron and steel, coke, glass, electrical, gas, and salt industries, which were to be enumerated by "expert special agents without regard to locality." Additional instructions appeared on the schedules as annotations to particular inquiries. The general manufacturing schedule, for example, asked the enumerators to exercise "great care . . . , especially in the case of small shops where no book accounts are kept."<sup>88</sup>

As has been shown, one of the distinctive features of the 1880 census was the numerous industrial histories. With the emphasis directed toward quantitative rather than qualitative data, the chief value of the 1890 reports was their abundance of statistical tabulations. In the words of Richmond Mayo-Smith, the leading instructor in statistics at that time, "the volumes on Manufactures of

<sup>87</sup> Wright and Hunt, *History and Growth of the United States Census*, p. 180.

<sup>88</sup> *Ibid.*, p. 363.

the Eleventh Census of the United States constituted the most elaborate attempt made anywhere to collect and present the facts of industrial life."<sup>89</sup>

As the *Compendium* was similar to that of 1880, it need not be described. The special reports on manufactures were contained in three volumes: The first consisted largely of general data about the number of establishments, capital, number of employees, costs, and motive power, arranged by State and industry, together with narrative studies of several industries; the second contained similar data for 165 principal cities; and the third consisted of narrative studies of the textile, electrical, publishing, and heavy industries.

To examine the content of the narrative reports, the study of the iron and steel industry has again been chosen for comparison with the 1880 report described above. The essay "Iron and Steel Manufacture" was prepared by Dr. William M. Sweet, who apparently lacked Swank's broad knowledge of the industry.<sup>90</sup> His role, like that of his successors in the Census Bureau, was to apply objective statistical techniques for the compilation of quantitative—not qualitative—data. Sweet's narrative was therefore devoted to an explanation of the tabulations he prepared to supplement those published in the *Compendium*. These additional tabulations included summaries of basic data for the years 1870, 1880, and 1890; State and regional statistics; the value of capital invested in active and idle plants and in plants under construction; the number of employees and total wages broken down by class of worker and wage scales; and data on capital, labor, and raw material for each branch of the industry.

The only section of the report with any historical narrative was the chapter entitled "Rolling Mills and Steel Works." The superficial explanation of the Bessemer and open-hearth processes was apparently intended for the uninformed reader.

The *Report on Mineral Industries* (1892) contained considerably more historical data than the report on manufactures, although the individual reports were not nearly as detailed as the reports for 1880. The author of the report on iron ore acknowledged the assistance of a number of engineers and geologists, including Pumpelly. The study of the aluminum industry is of value to scholars because of its recognition of the growing importance of the mineral. "Aluminum," the author noted, "has been attracting an amount of attention during the last 2 or 3 years which is out of proportion to its actual (1890) importance as a metal and the position in the arts which it has hitherto occupied" (p. 277).

Although the report on petroleum by Joseph D. Weeks contained historical data in recognition of the growing importance of the industry, the data were quite brief because of Weeks' belief that "the admirable report of Professor S. F. Peckham, made at the Tenth Census" was "so thoroughly presented" that a full treatment of the subject was unnecessary (p. 425). Much of the information in the report was "freely-given" by officers of the Standard Oil Co. No

<sup>89</sup> Richmond Mayo-Smith, *Science of Statistics*, 2:159 (New York, 1899).

<sup>90</sup> Census Office, *Eleventh Census, Report on Manufacturing Industries in the United States . . . Part III, Selected Industries*, p. 383-483 (Washington, 1895).

firm was in a better position to supply financial, operating, and production statistics for petroleum.

Many of the questions historians might raise about the validity of the data for the Eleventh Census were answered by the contemporary professional statisticians. Apparently William McGuffey's course on political economy and statistics at the University of Virginia in 1845 was the first in which the word "statistics" was used in an American course title.<sup>91</sup> The first modern course, however, was delayed until 1873 when Walker lectured at Yale College. When the reports for the 1890 census were published, more than 20 colleges were offering courses in statistics, of which the best known was given by Richmond Mayo-Smith at Columbia College.<sup>92</sup>

Mayo-Smith's textbook, *Science of Statistics*, was published within a few years of the 1890 reports. His comments about them—a favorable one is quoted above—were therefore tentative. He warned readers not to compare the 1880 and 1890 data on capital expenditures as the figures were not comparable "in the existing state of the data" (2:160). In fact, Mayo-Smith questioned the capitalization data because of the vagueness of the definition of "capital" and criticized the inexact use of the term "product" in gathering production data (2:163, 169-170, 188).

Other statisticians criticized the methods used in gathering and tabulating data. H. L. Bliss of Chicago, who had been consulted about the preparation of inquiries concerning the labor force and wages, attacked the validity of much of the manpower, costs, and production data.<sup>93</sup> His criticism were most valid when he showed that data for the various censuses were not comparable. Even for recent censuses, the user must adjust the figures for comparison and analysis.

Charles J. Bullock, a Harvard professor of economics, felt that the reports on urban wages were more accurate in 1890 than similar statistics in 1880, but the 1880 wage statistics for "country districts" were more accurate than those for 1890.<sup>94</sup> S. N. D. North, later director of the census, came to the defense of the 1890 reports of manufactures by pointing out that their data concerning costs were more accurate than those for 1880. "The eleventh census," North concluded, "was . . . a vast improvement over all its predecessors, in the system and intelligence with which the schedules were classified, revised, tabulated, and verified."<sup>95</sup>

<sup>91</sup> Fitzpatrick, "The Early Teaching of Statistics in American Colleges and Universities," *American Statistician*, Vol. 9 (Dec. 1955), p. 12.

<sup>92</sup> *Ibid.*, p. 13.

<sup>93</sup> H. L. Bliss, "Eccentric Official Statistics," *American Journal of Sociology*, Vol. 2 (Jan. 1897), pp. 515-531, Vol. 3 (July and Nov. 1897), pp. 79-99, 355-377; "Census Statistics of Child Labor," *Journal of Political Economy*, Vol. 3 (March 1905), pp. 245-257; and "Our Misleading Census Statistics," *American Journal of Politics*, Vol. 5 (Oct. 1894), pp. 417-428.

<sup>94</sup> Charles J. Bullock, "Wage Statistics in the Federal Census," *The Federal Census: Critical Essays by Members of the American Economic Association* (New York, 1899), p. 357.

<sup>95</sup> S. N. D. North, "Manufactures in the Federal Census," pp. 263-264.

William M. Steuart, who directed the census of manufactures, also defended his data. Although he admitted that the statistics were by no means absolutely accurate, he insisted that the 1890 data could be compared with those of 1880 to arrive at a reasonable approximation of the rate of growth in the American economy.<sup>96</sup>

An evaluation of the 1880 and 1890 census reports, as well as the earlier ones, prepared with the perspective of time by Samuel H. Stouffer, sums up their virtues in the light of their admitted faults:

In the 1880's research in economics, sociology, political science, and education had hardly begun. The science of statistics was still awaiting its Persons, Westergaards, Borkiewicz, Edgeworths, Mitchells, and Fishers. The social science research in Francis A. Walker's census of 1880, and in publications of the 1890 census completed under the supervision of Carroll D. Wright, probably was more significant, both in quantity and quality, than all the university research of the period put together. . . . When one goes back a half century to the regular census volumes of 1880 and 1890, before the establishment of a permanent Bureau, one is astonished at both the quality and volume of analytical research in a period when the social sciences in the universities were still branches of philosophy, with little interest in data.<sup>97</sup>

After the 1890 census, the reports came under even more careful scrutiny by economists, statisticians, and sociologists. It is therefore rarely necessary for historians themselves to engage in minute analyses of each of the 20th-century reports before using the statistics as sources.<sup>98</sup> The later reports also became almost exclusively quantitative, making for less variance in their content from census to census.

<sup>96</sup> William M. Steuart, "Official Statistics," *American Journal of Sociology*, Vol. 3 (Mar. 1898), pp. 622-630.

<sup>97</sup> Samuel A. Stouffer, "Problems of the Bureau of the Census in Their Relation to Social Science," Report of the Science Committee to the parent National Resources Committee, *Research—a National Resource*, Vol. 1 (Washington, Nov. 1938), pp. 205, 220.

<sup>98</sup> They should, of course, continue to use critical judgment and scientific statistical techniques in analyzing and applying quantitative data for specific historical problems.