ANNUAL SAMPLE UPDATE OF THE CENSUS BUREAU'S MONTHLY BUSINESS SURVEYS

Sol D. Helfand, Lawrence R. Impett, and Mitchell L. Trager - Bureau of the Census

I. INTRODUCTION

A. Overview of Current Business Programs

One of the primary missions of the Bureau of the Census is to provide current estimates which measure the levels and trends of major economic areas. These include monthly reports covering retail trade, wholesale trade, and selected service industries.

The Monthly Retail Trade Survey [7] provides estimates of sales of retail stores in the United States by kind of business and geographic area as well as national estimates of accounts receivable balances owed to retailers, by kind of business. Sales estimates are shown for regions, geographic divisions, selected large States, Standard Metropolitan Statistical Areas (SMSA's), and cities. In addition, monthly department store sales are shown for about 220 SMSA's, cities, and miscellaneous areas. Separate estimates are also published for the larger firms operating 11 or more retail establishments. These types of firms. are referred to as "Group II" firms and described in greater detail in this paper. The Group I component consists of all other retail establishments.

The Selected Services Survey [8] provides monthly estimates of receipts of businesses engaged in selected service industries at the U.S. level. A supplemental survey covering health, legal, engineering, architectural, and surveying services is under development. Data for these services have not been published as yet. The sample for these supplemental services is currently being updated but will not be covered in this paper.

The Monthly Wholesale Trade Survey [9] provides estimates of sales and inventories of merchant wholesale employer firms. Merchant wholesalers, such as wholesale jobbers and industrial distributors, are wholesalers who take title to the goods they sell. Estimates are published by kind of business for each of the nine geographic divisions.

All survey results are developed as direct measures from samples representing all sizes of firms and kinds of business within each trade area throughout the United States. The new sample like the old is a probability sample, and the estimating procedures used are similar in many respects to the old sample. The sampling units for the list sample component consist of both companies and EI's. To be eligible for initial selection to the certainty stratum, a known multiestablishment company had to have total sales or receipts (on a 1972 basis) above the predetermined cutoff. The company, which might consist of many EI's, was the sampling unit; therefore, any new establishments acquired by the company, even if under new or different EI's, were in the sample with certainty. Single establishment companies, whether or not selected with certainty, were considered as EI sampling units.

All companies below the certainty cutoff were treated on an EI basis; that is, the EI was the sampling unit. Noncertainty EI sampling units include both single establishment and multiestablishment companies.

The certainty component is a fixed sample which reports data every month. Rotating samples are used for the noncertainty component. For sampling units in the rotating panels, 2 months of data are obtained at each enumeration. For example, February rotating panel cases report data for February (the current month) and January (the previous month). In the following month, a different panel (the March panel) reports figures for March and February. Three sample panels are used in the new sample. There were four panels in the old sample. The use of rotating samples permit the use of a composite estimating procedure which provides estimates more reliable than those which would be obtained from a completely fixed sample of about twice the size. In addition, this procedure reduces the reporting burden of selected businesses. Reporting in the monthly surveys is voluntary and is authorized under title 13 of the United States Code.

The current samples consist of two components:

1. The list sample which is selected from the universe of employers who make social security payments for their employees under the Federal Insurance Contribution Act. Canvass of this component is primarily by mail. The surveys of retail trade, merchant wholesale trade, selected services, and supplemental services each have a list sample component.

2. The area sample which covers businesses without employees and employers, mainly recent "births" (new businesses), not represented in the list sources. Personal enumeration is used for this component. Currently, merchant wholesalers and supplemental services are excluded from the area sample.

B. Introduction of Revised Business Surveys

In November 1977, separate historical reports for retail trade, wholesale trade, and selected service industries were published by the Bureau of the Census, which reflected the results of an extensive modification of the monthly business sample surveys. The data in the retail and wholesale reports replaced the estimates previously published for the period January 1967 through August 1977. The revised series for selected service receipts covered the period January 1972 through August 1977 [10], [11], and [12] . Beginning with the September 1977 publication, the regular monthly reports have been based on the new samples and are consistent with the revised data shown in the historical publications.

This program represented the most ambitious sample revision ever undertaken by the Bureau's Business Division, and involved more than two and a half years of intensive effort. The revision is described in [4] and [5]. The major elements of the revision included -

• A new sample design which includes both company and Employer Identification (EI) number sampling units;

• A new sample of business firms;

• Benchmarking of sales and receipts to the results of the 1967 and 1972 economic censuses;

• Redefinition of sales and receipts to exclude sales taxes and finance charges;

• Conversion from kind of business classifications based on the 1967 Standard Industrial Classification (SIC) Manual to classifications based on the 1972 SIC Manual [6]; and

• Revision and updating of seasonal adjustment factors.

The new sample design includes a number of improvements over the old sample which are described in [2]. Of note is the increased sample efficiency under the new design which permitted a reduction in the number of firms requested to report and at the same time reduced the levels of sampling variability for most kinds of business. The table in Appendix A compares the sample sizes in the old and new designs. Appendix B compares the measures of sampling variability for the old and new samples of retail trade. Similar improvements were made to wholesale trade and selected service industries.

The revised retail, service, and wholesale samples were selected initially from the 1974 Standard Statistical Establishment List (SSEL), which is a directory, developed and maintained by the Census Bureau, representing the universe of domestic establishments with one or more paid employees in all areas of economic activity.1/

Although the initial sample is updated on a quarterly basis to reflect EI "births" (new businesses) and "deaths," it has long been recognized that additional interim steps must be taken between major sample revisions to maintain the quality of the statistics compiled from the sample. To this end, the Division is currently engaged in its first annual update, the highlights of which are described in this paper.

C. Sample Improvement Programs
The sample redesign and panel reselection was the first step in a program to upgrade and maintain the quality of the current business surveys estimates [1]. It is essential that sample updating and improvements continue in order to prevent deterioration and drift in the survey results and avoid major differences following the 1977 Economic Censuses such as were revealed by the results of the 1972 Censuses (refer to table 1).

TABLE 1
Current to Census Sales Comparisons - 1972

Survey	Sales and Receipts (in billions)		
	Census	Current	Percent differences
Retail	$471.0	$448.4	-4.8
Service	92.8	85.9	-7.4
Wholesale	321.6	298.3	-7.2
Total	$885.4	$832.6	-6.0

The annual sample update is one important component in the Division's comprehensive sample improvements program designed to meet our goals. In addition to the annual update, plans are in various stages for the following sample improvement projects -

• Annual and Census rebenchmarking - Research will be conducted into methodology for yearly benchmarking of monthly retail estimates to the Annual Retail Trade Survey (ARTS).

• Alternatives or improvements to the area sample - Planning has begun on the redesign or possible replacement of the present area sample. The use of independent lists, dual estimation procedures, computerized mapping methods, use of proxy measures in lieu of area sample estimates, and the suitability of a redesigned area sample along traditional lines are currently being investigated.

• Reduction of nonsampling error - In an effort to reduce nonsampling error the following areas will be reviewed and modified as necessary:
- efficiency of data edits
- interpretation of clerical and data collection processing instructions
- expansion and documentation of quality control procedures

II. ANNUAL SAMPLE UPDATE

The primary objective of the annual update is to redefine the certainty stratum of the retail, service, and wholesale samples by identifying businesses which have exhibited significant growth since the initial sample selection. Firms which have grown to the extent that they qualify for "certainty" will be added to the sample and asked to report on a company basis. For example, a firm which qualifies for the certainty component of the retail sample will be asked to report data covering all domestic retail establishments operated by the company and its subsidiaries. All noncertainty EI sampling units already in the sample will be dropped if they are affiliated with a certainty company. As a part of the annual update, the Group II component, a subset of the certainty stratum of the retail survey will also be redefined. In addition, establishments in the retail survey will be reconciled to information collected in the Company Organization Survey and the tabulation characteristics for service and wholesale companies will be updated. These operations are described in greater detail below.

A. Certainty Determination
For the first annual update, large companies with substantial growth which are not already in the certainty stratum will be identified using 1976 annual payroll data from the SSEL.

Initially, the certainty determination will be limited to multiestablishment firms (multiunits) in the SSEL. A study was conducted to determine the potential benefits of including single establishment firms (single units) in the updating operation [3]. Because of the small number of single units identified for possible candidacy to certainty and the high cost of processing the single unit component of the SSEL, a decision was made to limit the initial update to multiunits in the SSEL. As more complete information becomes

available on the volatility of single unit firms, subsequent annual updates may be expanded to include both single and multiunit firms.

The determination of which companies will be added to the certainty component of the samples for retail trade, wholesale trade, and selected service industries is carried out independently for each trade area. A company conducting business within the scope of more than one trade area (e.g., retail and wholesale) will be considered in retail and wholesale separately based solely upon the measures of size of its establishments inscope to the trade area in question. If only the retail component qualifies for certainty the company will be requested to report data for only its retail activities. Furthermore, a company can be certainty in one trade and noncertainty in another. No companies will be removed from the certainty stratum as a result of the update.

The following steps will be followed in conducting the certainty determination operation:

Step 1: Each SIC code in each trade area is assigned a predetermined sales/receipt cutoff. These cutoffs determine which companies meet the size requirement to be selected into a certainty strata. The cutoffs represent the certainty size cutoffs used in the initial sampling operation modified by the 1976 to 1972 sales ratio for the SIC.

Step 2: The 1976 multiunit SSEL file will be examined and all domestic establishments which are inscope to one of the trade areas being updated--retail trade, wholesale trade, or selected service industries will be identified. For wholesale trade, only merchant wholesalers are inscope to the survey. Only those inscope establishments which were active at the end of 1976 and had positive 1976 annual payroll (APR) will be considered.

Step 3: A 1976 measure of size (MOS) is computed for each active and inscope establishment as follows:

1. For establishments in the 1972 Census of Business, MOS is computed as follows:

$$MOS = 1976 \; APR * \frac{1972 \; Census \; sales}{1972 \; Census \; annual \; payroll}$$

where "APR" equals annual payroll.

2. For the remaining establishments, MOS is derived as follows:

$$MOS = 1976 \; AAPR * \frac{\beta}{4}$$

where "AAPR" equals annualized annual payroll (for establishments beginning operations subsequent to January 1976 the 1976 payroll is inflated to an annual dimension); and β is the relationship between annual sales to quarterly payroll developed by kind of business from 1972 Census of Business records.

Step 4: The measures of size computed in Step 3 are summarized by kind of business within the company and for the entire company.

Step 5: A "major" kind of business is assigned to each company being subjected to the certainty determination procedure by identifying that "fully coded" SIC with the largest proportion of the company's total MOS (computed over all SIC's fully coded or not). Since some establishments on the SSEL do not have SIC codes at the full 4-digit level of detail provided for in the 1972

SIC manual, a list of SIC's designated as "fully coded" has been compiled. "Fully coded" SIC's are 3- or 4-digit SIC's or groups of 3- and/or 4-digit SIC's. The structure of the Standard Industrial Classification system makes it possible to classify establishments on a 2-digit, a 3-digit, or a 4-digit SIC basis according to the level of detail desired.

Step 6: The company is selected into the certainty component if it meets at least one of the following conditions:

1. The company's total MOS across all SIC's ("fully coded" or not) is greater than the 1976 cutoff corresponding to the "major" SIC or,

2. The total MOS for one or more "fully coded" SIC's within the company is greater than the 1976 cutoff corresponding to that SIC.

Since the number of cases to be added to the certainty component is dependent upon the cutoffs and is unknown at the outset, provisions are made to adjust the cutoffs and rerun the determination based upon the results of a preliminary run. Too many cases added to the certainty component would result in excessively high sample operating costs.

B. Redefinition of Retail Group II Component

The annual update will include a redefinition of the Group II component of the retail sample. Currently, Group II consists of companies which were selected with certainty and had 11 or more retail establishments at the time of the initial sample selection. Under the previous sample design, the Group II list was changed only to reflect the latest census of retail trade. As requested in a poll of data users, Group II will be modified to reflect the number of retail establishments as of December 31 of the update year (in this case, 1976). Companies which were in Group II but had less than 11 retail establishments on December 31 will be dropped from Group II. Companies which are in the sample with certainty but are not Group II, as well as companies added to the certainty strata during the annual update, will be added to Group II if they had 11 or more retail establishments as of December 31.

C. Auxiliary Operations

Upon completion of the certainty determination and retail Group II redefinition operations it will be necessary to update a number of computer files used for mailing and tabulation purposes. In addition, information will be compiled from the SSEL for use in updating establishment and company records maintained from the current business surveys. These auxiliary operations are described briefly below.

1. Mandatory File Updating Operations-- There are three primary files which will require updating to reflect the results of the annual update.

a. Data and Mailing Register--All data required for mailing and tabulation purposes are maintained on a data register. The register will be updated as follows:

● New certainty companies (and associated retail establishments for retail companies) will be added. To reduce the reporting burden, retail companies with more than 25 establishments will be subjected to establishment

subsampling and will be asked to report monthly sales data for only their selected establishments.

● EI sampling units determined to be affiliated with new or existing certainty companies will be deleted.

● The code which identifies retail Group II companies will be updated to reflect the results of the annual update.

b. EI Universe--A universe file is maintained of all EI numbers subjected to sampling in the Division's monthly programs. The EI numbers associated with employer establishments canvassed in the area sample are matched to the universe to determine whether the establishments are represented by the list sample component of the survey. (Establishments with active EI numbers that have been subjected to list sampling are excluded from the area sample.) It will therefore be necessary to update the EI universe to distinguish those EI numbers associated with new or existing certainty companies.

c. Composite Estimating Procedures-- The published estimates are derived from a composite estimation procedure which employs a percentage of the previous month's preliminary composite estimates. EI sampling units tabulated in the monthly samples prior to the annual update, which are determined to be affiliated with a certainty company, will pose a special problem in the estimating procedure. Such sampling units will be represented on both a company and EI number basis (in terms of their previous month's preliminary effect) unless special steps are taken. As such, arrangements will be made to offset the effects of these sampling units on the previous month's preliminary composite estimates at the time the revised sample is introduced.

2. Analytical Operations--In addition to the required updating operations, a number of related analytical operations will be performed which make use of current information available from the SSEL. These operations include the following:

a. Retail Establishment Update-- Some multiunit firms in the retail survey provide data for the entire company or EI but do not report sales for their individual retail establishments. Still others are complete refusals and provide no information at either the sampling unit or establishment levels in the monthly programs. Efforts will therefore be made to update the list of inscope establishments for these firms based on data provided in the mandatory 1976 Company Organization Survey. Inactive, sold, or closed establishments will be removed from the data register while new store openings and acquisitions will be added. The monthly sales data imputed for the updated list of establishments should yield more accurate kind of business and geographic area statistics. For the remaining retail firms, potential underreporting of newly opened or acquired retail establishments will be revealed by identifying active establishments on the SSEL (as reported in the mandatory COS program) which are not on our monthly mailing register. Such cases will be added to the register after review by the subject matter analysts.

b. Wholesale and Service Company Analysis--Unlike retail, data are not tabulated at the establishment level for wholesale and service companies. An analysis will therefore be made of shifts in the kind of business distribution between 1975 and 1976 for wholesale and service companies. Where substantial shifts have occured, the mailing and tabulation register will be updated to reflect the current status of the organization.

c. Measuring the Effects of the Annual Update--While we anticipate minor shifts in the dollar volume levels between the original and updated samples, several approaches will be used to gauge the impact of the annual update on the monthly tabulations. The first approach will entail summarizing the sales used for sampling by kind of business and panel for sampling units added to (i.e., company adds) and dropped from (i.e., EI sampling units determined to be affiliated with a certainty company) the sample. The difference between these two components will illustrate the differences in dollar volume levels, if any, between the original and updated sample estimates.

Under the second approach, monthly data will be tabulated by kind of business on both an old and new sample basis for the previous three data months. This approach will yield the following information not provided under the first approach:

--comparisons by data month
--measurement of levels of retail accounts receivables and wholesale inventories
--measurement of shifts between the Group I and II components of the retail survey

In addition, sampling error (measured by estimates of the coefficient of variation) will be compared before and after the update. It is expected that reductions in the sampling error will be achieved, especially for sales estimates in rapidly expanding kinds of business.

Footnote

1/ For multiestablishment firms in the SSEL, basic information came from the 1972 Economic Censuses. All domestic establishments of these firms were identified by their individual SIC codes, physical locations, measures of size, etc. Beginning in 1974, an annual Company Organization Survey (COS) was undertaken to insure that the organizational structure of each company would be updated at least once each year for the larger multiestablishment firms and once every three years for the smaller organizations. In conjunction with the COS program, information on annual and first quarter payroll and first quarter employment is collected for each active establishment owned or controlled by the company.

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Appendix A. Current Business Surveys: Comparison of Preliminary
Sample Sizes in New and Old Designs, Reporting Units

Trade Areas		List Sample			Area Sample Per Month	Monthly Total	List Sample Total
		Fixed Panel	Rotating Panels	Per Month			
Retail							
	Old	3,400	12,200	15,600	600	16,200	52,200
	New2/	2,800	9,200	12,000	500	12,500	30,400
Service1/							
	Old	950	5,650	6,600	500	7,100	23,550
	New2/	1,200	5,000	6,200	500	6,700	16,200
Wholesale							
	Old	1,200	4,200	5,400	--	5,400	18,000
	New2/	1,950	3,750	5,700	--	5,700	13,200
Total							
	Old	5,550	22,050	27,600	1,100	28,700	93,750
	New2/	5,950	17,950	23,900	1,000	24,900	59,800

Note: In the new series, classification is based on the 1972 SIC. In the old series, classification was based on the 1967 SIC. There were a number of changes, including complete kind-of-business shifts from retail trade into wholesale trade (e.g., farm equipment dealers; hay, grain, and feed stores; electrical supply stores).

1/ Includes the sample for the unpublished estimates of health and legal services.

2/ Several hundred companies were "split" into two or more reporting units to facilitate reporting kind-of-business distribution.

Appendix B. Comparison of Old and New Series Estimated Measures of Sampling Variability of Monthly Retail Sales by Kind of Business for the United States

(Median coefficients of variation in percent)

1972 SIC Code	Kind of Business	Old Series	New Series
	Retail trade, total	0.6	0.6
	Durable goods stores, total	1.4	1.0
52	Building materials, hardware, garden supply, and mobile home dealers	3.6	2.0
521, 3, 5	Building materials and hardware	3.2	1.9
521, 3	Building materials and supply stores	4.2	2.6
525	Hardware stores	9.6	4.8
55 Ex. 554	Automotive dealers	1.7	1.5
551, 2, 5, 6, 7, 9	Motor vehicle and miscellaneous automotive dealers	1.8	1.5
551, 2	Motor vehicle dealers	1.7	1.4
551	Motor vehicle dealers (franchised)	1.6	1.4
553	Auto and home supply stores	4.1	3.5
57	Furniture, home furnishings, and equipment stores	3.7	2.1
571	Furniture and home furnishings stores	4.7	3.0
5712	Furniture stores	5.2	2.9
5722, 32	Household appliance, radio, and TV stores	6.4	3.4
5722	Household appliance stores	7.4	5.3
	Nondurable goods stores, total	0.9	0.7
53	General merchandise group stores	1.2	0.4
531, 9	Department stores and misc. general merchandise stores	1.2	0.4
531	Department stores	0.4	0.0
533	Variety stores	1.6	1.9
54	Food stores	1.6	1.1
541	Grocery stores	1.8	1.1
546	Retail bakeries	6.8	6.7
554	Gasoline service station	2.4	2.5
56	Apparel and accessory stores	3.0	1.6
561	Men's and boys' clothing and furnishings stores	5.4	4.4
562, 3, 8	Women's clothing, specialty stores, furriers	4.2	2.4
562	Women's ready-to-wear stores	4.6	2.3
565	Family clothing stores	5.0	3.0
566	Shoe stores	5.4	3.0
58	Eating and drinking places	2.8	2.3
5812	Eating places	2.8	2.5
5812 pt.	Restaurants, lunchrooms, cafeterias	3.4	3.3
5813	Drinking places (alcoholic beverages)	4.5	5.1
591	Drug and proprietary stores	3.2	1.3
592	Liquor stores	4.4	3.4
5961 pt.	Mail-order house (department store merchandise)	0.1	0.0

Note: Measures of sampling variability are based on sales estimates not adjusted for seasonal variations, holidays, or trading-day differences.