Department of Commerce
United States Census Bureau
OMB Information Collection Request
Annual Capital Expenditures Survey (ACES)
OMB Control Number: 0607-0782

B.   Collections of Information Employing Statistical Methods

   1.   Universe and Respondent Selection

   The Annual Capital Expenditures Survey (ACES) covers all domestic, private,
   non-farm businesses in the U.S., including nonemployer businesses. Major
   exclusions are foreign operations of U.S. businesses, businesses in the U.S.
   territories, government operations (including the U.S. Postal Service), agricultural
   production companies and private households. ACES collects information from
   only a portion of these businesses, selected using a stratified simple random
   sample design. Categories such as business activity, number of employees,
   amount of payroll, legal form of organization, or a combination of those factors
   define the strata. The number and composition of these strata change from year to
   year. The universe of approximately 30.9 million businesses can also be viewed at
   a more stable higher level as three non-overlapping categories based on the
   number of employees.

Category	Description	Universe	Approximate Sample Size for Fiscal Year 2019
I	Companies with 500 or more employees	19.4 thousand	19,400
II	Companies with 1 to 499 employees	5.8 million	30,600
III	Nonemployer Companies	25.1 million	20,000
	Total Sample Size	30.9 million	70,000

   Each year a new sample is selected, independent of the previous sample. While
   the general criteria are the same, such as number of employees, each sample is
   based on new administrative data and new probabilities of being selected.

   All companies defined in Category I have administrative data showing they have
   500 or more employees. This is a sufficient metric to be included in the sample
   each year, although businesses do enter and exit this category each year. This

category is referred to as the "Certainty group." Although business activity and legal form of organization may be used to further define this Certainty group, all of these businesses will be included in the final sample.

The remaining two categories are referred to as 'Noncertainty groups', with payroll determining whether they have employees or are nonemployer businesses. Business activity, amount of payroll, and legal form of organization define the strata within these groups. Stratified simple random samples of businesses in the Noncertainty groups are selected independently each year.

A new independent sample can use updated administrative data, adjusting for the changing distribution of businesses by industry and size. It also allows new and emerging businesses a chance of timely representation, while reducing the chance of burdening smaller businesses being included cycle after cycle.

The total sample size, and the allocation of that sample between the categories has changed. The amount proportioned to Category III, the nonemployer companies, has been reduced from 30,000 to 20,000, a reduction of 10,000 cases. The amount proportioned to Categories I and II has been increased from 45,000 to 50,000, an increase of 5,000 cases. Since the size of the sample for Category I is relatively stable and based on administrative data, the increase of 5,000 for Category I and II will be seen in the sample size for Category II.

The survey unit response rate is expected to be about 70 percent. The reporting unit response rate (URR) is the ratio of the number of active, in-scope businesses that provided sufficient data to be considered a respondent to the total number of active, in-scope businesses in the sample, times 100 percent. The URR assesses the risk of nonresponse bias. A similar metric about nonresponse bias is the Total Quantity Response Rate (TQRR), defined as the proportion of the published estimates coming from respondent data using only their original unadjusted-for-nonresponse sampling weights. The TQRR is expected to be about 90 percent. The difference between the expected response metrics is due to the lower unit response rates from smaller, often nonemployer businesses, that have less impact on the estimates than larger businesses.

2. Procedures for Collecting Information

   a. Statistical Methodology for Stratification and Sample Selection

   The sample frame is constructed from the Census Bureau's Business Register (BR). Databases of employer businesses are used to develop the ACES employer sampling frames, Categories I and II, and a portion of Category III. The sampling frame for employer businesses in Category II contains about 5.8 million companies after all the establishments are consolidated by ownership. From this frame, a stratified random sample will be drawn. About 19,400 will be selected with certainty as Category I,

while an additional 30,600 will be selected probabilistically from the remainder of the frame as Category II.

A separate database of nonemployer businesses is added to this to complete the frame for Category III. The nonemployer frame will have about 25.1 million companies. From this frame, a simple random sample will be drawn of about 20,000 companies.

The BR employer databases contain records for each establishment location of a business with paid employees in the United States, including company ownership information that links separate locations under the same company ownership. Establishment data are consolidated to create company level records. Information about each six-digit NAICS industry that an establishment has activity for, including employment and payroll information is known, and is aggregated to the company level. An algorithm that inspects payroll at a company's various establishments assists in the assignment of each company to its own ACES level industry code.

The Category I employer frame of large companies with 500 or more employees are all selected with certainty. This category is still subdivided into substrata based on the ACES level industry code assigned to each company, but this does not affect sampling since all of these companies are already included. This sample size will be approximately 19,400, but varies cycle to cycle based on the number of companies that meet the 500 or more employees threshold.

The Category II employer frame, those companies with between 1 and 499 employees, is stratified by four different levels of payroll size by ACES level industry code. This generates several hundred substrata, whose boundaries are set in an effort to minimize the sampling error by using payroll as a proxy for the unknown value of capital expenditures. Boundaries of the substrata are adjusted by several additional guidelines, such as reducing sampling weights if they get too large. Each company will have a probability of selection, independently assessed each cycle. The sample size from this category will be approximately 36,400, but will vary cycle to cycle based on how many were selected in Category I so that the total sample size for the survey remains constant.

b.   Estimation Procedures

Businesses with employees (Categories I and II) participating in ACES are allowed to respond in any and all industries in which they have activity. Businesses without employees (Category III) only have information collected at the business level, not the industry level. Estimates are created by aggregating information from all responding businesses. For industry level estimates, information is aggregated from all businesses contributing to an industry. Estimates are created using a Horvitz Thompson estimator.

The sampling variances are estimated using a delete-a-group jackknife replication method. Businesses with 500 or more employees (Category I) would be in all possible samples that could have been selected, and do not contribute to the sampling variance. Businesses with between 1 and 499 employees (Category II) and non-employer companies (Category III) have a probability of being selected in any particular sample, and will contribute to an estimate of sampling variance. Each of these businesses selected for the sample is assigned a group, and by appropriate adjustments to their weights, a distribution of estimates can be created, which can be used to estimate the sampling variance.

c.   Degree of Accuracy Needed

ACES serves as a benchmark for current economic indicators and provides data to refine estimates for the national income and product accounts. These data uses require a high degree of reliability. The sample allocation is designed to minimize sampling variability by selecting higher relative proportions of companies in strata thought to contribute the largest capital expenditures. However, capital investment is difficult to predict, and sampling variability for any particular industry can vary cycle to cycle.

d.   Unusual Problems Requiring Specialized Sampling Procedures

There are no unusual problems requiring specialized sampling procedures.

e.   Use of Periodic (less than annual) Data Collection Cycles to Reduce Burden

There are no periodic data collection cycles less frequent than annual to reduce burden.

3.   Methods to Maximize Response and Accounting for Nonresponse

a.   Follow-up Procedures

The initial mailing of letters requesting that businesses respond to ACES occurs in March in the calendar year after the survey reference cycle. Businesses are requested to complete the online survey by mid-April and receive a due date reminder prior to that date. Reminder letters and/or telephone calls encouraging participation will continue to be directed to all companies that have not responded by the designated time. Businesses that have not responded by the due date will receive a follow-up letter in early May. Employer businesses that have not responded by late May will receive a certified letter in mid-June. Nonemployer businesses will receive a noncertified letter. Employer businesses that are still delinquent in early July will receive a noncertified letter in mid-July. Selected employer businesses will receive an additional follow-up, referred to as a targeted follow-up, by telephone from mid-August to late September.

.   b.   Estimation for Missing Data

The correction for missing data in ACES is at the tabulation unit level, instead of by data item. ACES uses a nonresponse weighting adjustment to increase the contribution of responding businesses for inferences back to the entire population. The responding business' contribution is weighted to account for both businesses that were never selected for the sample, and for those selected eligible businesses that did not respond. This process adjusts the estimates to reflect the reduced amount of observations expected from the sample. Using a nonresponse weighting adjustment increases the sampling variance as it incorporates having fewer measurements due to the nonresponse.

Businesses selected for ACES are assigned an initial sample weight that is a function of the number of businesses in that stratum and the number of businesses selected for the sample. The initial weights of all selected businesses in a stratum are the same. The weights are adjusted during processing, separately for each stratum, to account for businesses that are selected for the sample but do not respond. A selected business in any category that does not respond has its weight adjusted to zero.

c.   Reliability

The estimates for ACES differ from tabulations created from a complete census conducted under similar conditions due to only measuring a subset of the population. ACES estimates are affected by the uncertainty of having chosen just one of the many possible samples. Each estimate in ACES is

accompanied by a corresponding estimate of that item's sampling variance to reflect this uncertainty. The relative standard error (RSE) is a common form of sampling variance, used in ACES. RSEs for total capital expenditures, total structure expenditures and total equipment expenditures at the U.S. level for businesses with employees is generally less than 3%. RSEs for other items, for businesses without employees, or for lower levels of detail such as business activity, will generally have higher RSEs to reflect the larger uncertainty. These RSEs can be used in statistical testing of differences.

4.   <u>Testing of Procedures or Methods</u>

ACES methodology originated in a 1991 pilot and response analysis survey, and again in the 1992 preliminary survey, and received extensive testing and modification. The collection instruments, instructions, mode of collection, definitions, and other processes have been adjusted based on findings from the annual surveys over time. Each new cycle is an opportunity to analyze data and response metrics to learn more about the variability of capital expenditures by size of company and industry. This information is used to improve the survey design and sample allocation as a vehicle to ultimately improve the utility of the survey results. We are currently conducting cognitive interview testing for the collection of capital expenditures for robotic equipment. Based on these findings, we will refine the question, instructions, and survey definitions. As we continue to receive feedback from respondents, we will learn more about robotic equipment and make revisions accordingly. Research continues to explore improvements in the sampling design and how to improve the utility of the statistics for data users.

5.   <u>Contacts for Statistical Aspects and Data Collection</u>

Within the Economic Statistical Methodology Division of the Economic Directorate of the U.S. Census Bureau, Xijian Liu, Methodology Director for Retail Wholesale & Services Programs, is responsible for directing the development of the methodology such as sample design, estimation, variance estimation, and treatment of non-response. Xijian Liu can be reached on (301) 763-4272 or Xijian.Liu@census.gov.

Within the Economy-Wide Statistics Division of the Economic Directorate of the U.S. Census Bureau, Valerie Mastalski, Chief of the Capital Expenditures Branch, is responsible for directing the development of the survey content and the survey processing and for coordinating the survey design to meet the survey objectives. Valerie Mastalski can be reached on (301) 763-3317 or Valerie.Cherry.Mastalski@census.gov.

<u>Attachments</u>

A.   Worksheets and Instructions

B.   Letters

C.   Selected Screen Shots from Electronic Data Collection Instruments

D.   Letters of Support