Introduction to the Capital Spending Report based on the ACES:

General Description of the ACES

The Annual Capital Expenditures Survey (ACES) is part of a comprehensive program designed to provide more detailed and timely information on capital investment in structures and equipment by nonfarm businesses. The data are used to improve the quality of current economic indicators of business investments, as well as the quarterly estimates of gross domestic product. The data also provide facts about trends in capital expenditures useful for identifying business opportunities, product development, and business planning. The Capital Spending Report presents select information from recent consecutive survey cycles to illustrate changes over time.

Background of the ACES

The scope of the survey includes all private, nonfarm, domestic companies. Major exclusions are government owned operations, foreign owned operations of domestic companies, establishments located in the U.S. territories, establishments engaged in agricultural production, and private households. The survey collects information from the company as a whole, and asks companies to report how to distribute their expenditures across different economic activity codes. Investment estimates from the ACES may not be directly comparable to investment data from other sources due to differences in the scope of the survey, definitions of concepts, the company based collection, ACES specific industry codes, and other sources.

Congress first provided funding for the ACES to the U.S. Census Bureau in fiscal year 1991. The first cycle was a relatively small feasibility study, whose main goal was testing the quality of questions and collection instruments, and to determine the ability of companies to report the requested data. A larger but still relatively small study the next year used the results of the feasibility survey in collecting 1992 data. The goal in that second cycle was to further evaluate what the survey content should be, assess burden

to respondents, refine the survey forms and instructions, and test how large of a sample might be required to obtain reasonably precise estimates.

Due to concerns about burden, the more detailed questions were asked every five years, beginning in 1993. That more detailed information is not part of this longitudinal report. This report focuses on total capital expenditures for new and used structures and equipment, as well as more information concerning expenditures within economic sectors for companies with five or more employees. The sample methodology has changed over time, including expanding the scope to include companies without employees, although data collection is not as detailed.

Initially, the Standard Industrial Classification (SIC) system was the basis for the industry categories used in the ACES. The North American Industry Classification System (NAICS) became the new basis beginning in 1999. Comparisons across classification systems are problematic.

The ACES uses various industry combinations developed through consultation with data users. NAICS has gone through several revisions since its inception, and has resulted in changes in the ACES industry categories. These industry categories are to publish capital expenditures data at various industry or sector levels for companies with employees.

The Current ACES

ACES publications of annual data come out about 13 months after the close of each reference year. The 2013 ACES report was published in February 2015. The 2015 Capital Spending Report continues the Census Bureau's effort to present annual ACES data longitudinally under NAICS, and covers the 2004 through the 2013 collection cycles. The series first report was in 2007, presenting information from 1999 to 2005 collection cycles. The series presented may not always be internally consistent due to changes in sample methodology, NAICS, and changes in company organization and classification over time. Previous sets of ACES data, either annual reports or prior

longitudinal reports, are available at http://www.census.gov/econ/aces/historic_releases.html .

As of the 2013 data collection cycle, the survey has a sample size of about 46,600 companies with employees from a frame of about 5.7 million. Those companies receive a more detailed ACE-1 form, of which there are three variations. The survey form asks for capital expenditures data for each industry in which they had activity and to classify these expenditures as new and used structures and equipment based on the definitions provided.

The sample also includes about 30,000 businesses without employees from a frame of about 31 million, which only receive a more limited ACE-2 form. This form only asks for capital expenditures data separately for new and used structures and equipment, but not about any industry level information.

ABBREVIATIONS AND SYMBOLS

The publication uses the following abbreviations and symbols:

– Represents zero in the table.

(Z) The value is greater than zero, but would round to zero in the table.

SAMPLING METHODOLOGY

Annual probability samples are the source of ACES estimates. Samples are from a database containing records for each physical business establishment, which is consolidated prior to sampling to create company level records. The sampling begins with automatically taking the largest companies in the frame. It continues with random sampling of the rest of the population, after stratifying by factors that include size, economic activity, and whether or not the company has employees. In that random sampling stage, larger companies are still more likely to be included in the sample. Each selected company has a sampling weight, reflecting both their own and other similar but unselected companies' investments. Larger companies will have weights

near one, while smaller companies could have weights above one hundred. A company's impact on the estimates will vary with their sampling weight and their reported data. Sampled companies in the same substratum have identical weights. A nonresponse adjustment may increase sampling weights further if some companies are selected but do not respond.

Like all probability samples, the results are subject to both sampling and nonsampling errors. Sampling error is the uncertainty due to seeking to measure only a subset of the target population, while nonsampling error is a general term for all other sources of error. Types of nonsampling include the inability to provide the requested information, difficulties in interpreting the question, mistakes in retrieving, entering, or recording of the information, issues concerning the sampling frame, or how to process inconsistent or missing information. While a census seeks to obtain measurements from an entire population, a probability sample reduces the resources required by reducing the number of measurements required. A census will have no sampling error, but many types of nonsampling errors may introduce significant bias into census results.

There are different ways to communicate sampling error. The standard error (SE) is in the same units as the estimate itself, a relative standard error (RSE) is often a percentage, while a margin of error (MOE) is useful for creating confidence intervals. The sample actually chosen and its corresponding estimate were just one of the many possible outcomes of the sampling method. The dispersion of the distribution created from the set of all possible estimates corresponding to all the possible samples is the standard error. The relative standard error is the ratio of the standard error to the estimate itself. Tables usually denote relative standard errors, but the sampling error for estimates that are percentages instead of values are standard errors. This is to avoid misinterpretations of a ratio of two percentages. In either case, the relative standard error and the standard error are themselves just estimates derived from the sample data, just as the estimates themselves are. Measures of sampling error then are also subject to sampling and nonsampling errors.

A margin of error is the product of the standard error and a multiplier, used to create confidence intervals (CI). A 90-percent confidence interval uses a margin of error that is approximately 1.6 times the standard error. The upper bound is the addition of the margin of error to the estimate, while the lower bound is the subtraction of the margin of error from the estimate. A 90% confidence interval contains the true value 90% of the time over repeated applications of the sampling methodology. Although in reality only a single sample is drawn, confidence intervals are still useful in assessing relative quality of the estimate, or for making comparisons between estimates. Confidence intervals are only an interpretation of sampling error. Any bias from nonsampling error that impacts the confidence interval is not considered.

To create a confidence interval for an estimate requires creating a margin of error (MOE). This begins with the relative standard error (RSE), which is a percentage. This percentage is divided by 100 to make it a proportion. Multiply this proportion by the estimate to obtain the standard error (SE) which is in the same units as the estimate. That SE is then multiplied by a set value to build a confidence interval with a known degree of risk. A 90% confidence interval is a common standard, which implies that by using this method, 90% of the intervals built would contain the true value sought, without considering any other sources of error outside of sampling variability.

As an example, here is a 90% confidence interval for the total capital expenditures for companies with employees invested in the mining sector in 2004. From table 2a, the estimate is $51,253 (millions). From table 2b, the RSE is 3.5. Converting the RSE into a SE means converting 3.5% into the proportion, 0.035. Next that 0.035 is multiplied by the estimate of $51,253 to get $1793.855 (millions). To get the margin of error for a 90% confidence interval, multiply this by 1.654 to get $2967.04, or rounding to the nearest million, $2967 (millions). Adding and subtracting this to the estimate gives us $48,286 to $54,220 (millions).

A complete description of the survey design is at http://www.census.gov/econ/aces/

Or see the ‘How the Data are Collected” tab.