



Economic and Social Council

Distr.: General
14 April 2016

English only

Economic Commission for Europe

Conference of European Statisticians

Group of Experts on National Accounts

Fifteenth session

Geneva, 17-20 May 2016

Item 5 of the provisional agenda

Use of Statistical Units in National Accounts

Survey Units for Economic Statistics – Do Our Current Practices Match Official Guidance or Are Some Changes Needed?

Prepared by United States Census Bureau¹

Summary

The 2008 System of National Accounts expresses a preference for the establishment as the unit of compilation for industrial statistics. This document will look briefly at the conceptual basis for International Standard Industrial Classification of All Economic Activities and North American Industry Classification System, compare the establishment definitions used in each classification, provide an overview of the units in several Census economic programs, and pull everything together with an example using retail trade.

¹ The opinions presented in this paper are those of the author and do not necessarily represent the official positions of the Census Bureau or other entities that Mr. Murphy may represent in a professional capacity.

I. Introduction

1. The 2008 SNA expresses a preference for the establishment as the unit of compilation for industrial statistics. In order to evaluate the appropriateness of that preference, there are a number of basic considerations that can frame a future argument.
2. First, the actual definition of establishment can have a large impact on the unit being surveyed. Second, the content and structure of the activity or industry classification impacts the homogeneity of the content to be classified. Finally, the ability to collect the desired data from the desired units is critical.
3. The United States has a decentralized statistical system with core economic estimates used in national accounts developed by different agencies using different sampling frames and different methodologies. The Office of Management and Budget mandates the use of a common industrial classification system by Statistical Policy Directive but there are many different program implementation decisions that impact comparability of estimates even when industries are defined in a common way.
4. This paper will look briefly at the conceptual basis for ISIC and NAICS, compare the establishment definitions used in each classification, provide an overview of the units in several Census economic programs, and pull everything together with an example using retail trade.
5. Suitability of statistics for national accounts use is impacted by variations in units and definitions. Before making any decisions on what is the preferential unit in the SNA, a review of what is being done in practice by countries may shine some light on the issue. There is also a need to balance respondent burden while simultaneously producing sound estimates. Is the focus on units a critical issue or should the focus be on quality estimates of the subject variables? Perhaps the answer is some combination of both.

II. Establishment Definitions and Classification Concepts

6. The structure and content of the industry or activity classification plays a role in the decision of what might be the most appropriate survey unit. ISIC Rev. 4 is based on a variety of concepts. Some industries are based on inputs, some on outputs, and some on processes. This implies that the level of homogeneity across industries varies unless the optimal criterion is chosen for each individual activity or industry. NAICS on the other hand uses a production function concept – similar establishments doing similar things in similar ways are grouped together. The homogeneity of industries can be high if the concept is applied and if the target unit of observation is also homogeneous.
7. If for example, all survey units are single location enterprises, the homogeneity of units can be expected to be higher than if all survey units are multi-location enterprises classified to a single dominant activity or industry.
8. There are also different establishment definitions used by ISIC and NAICS. ISIC defines the establishment as “an enterprise or part of an enterprise that is situated in a single location and in which only a single (non-ancillary) productive activity is carried out or in which the principal productive activity accounts for most of the value added.”² The North American Industry Classification System United States 2012 (NAICS) defines the

² ISIC Rev. 4, paragraph 80. Referenced at
http://unstats.un.org/unsd/publication/seriesM/seriesm_4rev4e.pdf

establishment as, “the smallest operating entity for which records provide information on the cost of resources-materials, labor, and capital-employed to produce units of output.”³

9. For the author, who has a background in classification, the physical location or establishment definition provided by ISIC makes intuitive sense. A single location undertaking one or more activities can easily be classified in an industry or activity classification. With some limited experience in survey work, the NAICS definition also makes intuitive sense because the goal of any data collection effort is to collect information on the topic being studied. In order to do that, the smallest operating entity for which records provide information is an appealing target. For a person with no experience in compiling national accounts but with a basic understanding of the requirements, data on both inputs and outputs in real terms are needed. Those data are available or produced at a variety of levels within complex multiunit enterprises.

10. When NAICS was adopted in 1997, it adopted a new establishment definition. Under the old SIC, the establishment was defined as “...an economic unit, generally at a single physical location, where business is conducted or where services or industrial operations are performed.”⁴ NAICS added a focus on the availability of records of inputs and outputs, or the basic requirements to develop value added.

11. There is substantial room for differences in implementation between the definitions used by ISIC (and the SNA) and NAICS. A surface review of programs in the US Statistical System highlights the room for variation. Some industry estimates are based on establishments variously defined as single physical locations or sometimes larger or smaller units. Many industrial statistics are not based on establishments at all but rather on something closer to “kind of activity units”⁵. As noted in literature, large companies and multinational enterprises have complex structures and are not easily decomposed into standard units.

12. Collectability was of such interest that the Economic Classification Policy Committee (ECPC) issued a separate issue paper on collectability of data in May 1993.⁶ Although the issues paper is somewhat dated, one important conclusion still holds based on the author’s experiences: “The survey found that recordkeeping practices vary widely, both within and across industries. Surprisingly, recordkeeping practices also vary within companies. Information such as employment and payroll is usually available by establishment, but detailed information on materials consumer or purchased and products or services produced or sold by type is much more difficult to report.”⁷

13. It should therefore be no surprise that various surveys in the US covering different variables of interest have different survey units.

III. Census Bureau Economic Statistics

14. The Census Bureau produces a wide range of economic statistics through numerous surveys and programs. These statistics have differing periodicity, scope, and units. Core

³ NAICS United States 2012, page 25. U.S. Office of Management and Budget, ISBN: 978-59888-549-1, published 2012.

⁴ Standard Industrial Classification Manual, 1987. Executive Office of the President, Office of Management and Budget, page 12.

⁵ ISIC Rev. 4 op. cit paragraph 85.

⁶ Economic Classification Policy Committee Issues Paper No. 3, Collectability of Data, accessed at: http://www.census.gov/eos/www/naics/history/docs/issue_paper_3.pdf

⁷ Ibid, page 4.

statistics are produced at the most detailed level of industry, product, and geography once each five years in the Economic Census. In the intervening years, annual industry estimates are produced for NAICS industries through the Annual Survey of Retail Trade, Annual Survey of Wholesale Trade, Annual Survey of Manufactures, and the Service Annual Survey. Estimates are also produced on a monthly or quarterly basis at more aggregated levels. One commonality in annual and more frequent estimates is the absence of geographic (i.e., state level) detail in most cases (annual country business patterns provides geographic establishment and employment data and the Annual Survey of Manufactures provides total sector-level estimates by state).

15. Looking at methodology descriptions from several U.S. Census Bureau programs highlights some of these issues. First, finding a description of the actual survey unit is not always easy. Some programs have extensive methodology descriptions while others provide less detail. Even when survey unit definitions are available, there are many exceptions to the general rules.

IV. The Economic Census

16. The most comprehensive industrial statistics at the Census Bureau are produced every five years with the Economic Census. *“The economic census is primarily conducted on an establishment basis. A company operating at more than one location is required to file a separate report for each location or establishment. Companies engaged in distinctly different lines of activity at one location are requested to submit separate reports, if the business records permit such a separation, and if the activities are substantial in size.*

17. *For selected industries, only payroll, employment and classification are collected for individual establishments, while other data are collected on a consolidated basis.”*⁸

18. The Economic Census survey unit is generally comparable with the establishment as defined by ISIC. The second consideration for distinctly different lines of activity can result in two reporting units at the same physical location. An example of that might be a factory outlet store at the same location as the factory. Finally, for selected industries, the survey unit is closer to the NAICS establishment when alternate reporting units (ARUs) are used because company recordkeeping does not allow collection at the location level. This is a common problem with businesses that operate in a distributed network such as telecommunications companies or banks.

19. Economic Census data are critical for the development of geographic data but the availability of data for individual physical locations can be poor or non-existent. While the establishment is the preferred unit, practical considerations allow for variations in the survey unit when needed to collect required data. In summary, the Economic Census generally uses a survey unit that aligns with the ISIC establishment definition although there are exceptions where the unit is smaller than the physical location and cases where the unit is more consolidated.

V. Annual Survey Estimates

20. Another critical input to the national accounts produced by the Census Bureau is the annual estimates developed in the Annual Survey of Manufactures, the Service Annual Survey, the Annual Survey of Retail Trade, and the Annual Survey of Wholesale Trade.

⁸ http://www.census.gov/econ/census/help/methodology_disclosure/basis_of_reporting.html

These separate annual survey programs use various survey units. Manufacturing uses an establishment definition that mirrors the establishment definition used in the Economic Census.

21. *“The Annual Survey of Manufactures (ASM) is conducted on an establishment basis. Reports are filed for those establishments selected in the sample. Companies engaged in distinctly different lines of activity at one location are requested to submit separate reports, if the plant records permit such a separation and if the activities are substantial in size.”*⁹

22. For service industries, the survey unit is not the establishment. *“To create the sampling units for multiunit firms, we aggregate the economic data of the establishments owned by these firms to an EIN level by tabulating the establishment data for all service establishments associated with the same EIN. Similarly we aggregate the data to a multiunit firm level by tabulating the establishment data for all service establishments associated with the same alpha number. No aggregation is necessary to put single-unit establishment information on an EIN basis or a firm basis. Thus, the sampling units created for single-unit firms simultaneously represent establishment, EIN, and firm information. The sampling frame is a complex amalgam of establishments, EINs, and firms.”*¹⁰ To simplify this definition, it can be described as all units under common ownership within the same NAICS industry. While technically not correct, it does give a clearer picture of the situation than describing it as a complex amalgam of establishments, EINs (employer identification number – issued by the tax authorities), and firms.

23. However, there are exceptions to the general rule that further complicate the situation. Surveys will create separate survey units to capture specific data when necessary. For example, retail trade might create separate reporting units to capture store retail and Internet retail when the activities are combined – such as the case where orders are placed over the Internet and fulfilled at the store location.

24. Annual estimates are generally benchmarked to the Economic Census data and a reconciliation process is performed to ensure consistent classification of establishments in the Census and survey units in the Annual estimates. It is important to note that annual estimates are generally not produced below the national level. Geographic breakdowns are rarely produced.

VI. Quarterly and More Frequent Estimates

25. For Service industries, quarterly estimates are provided that use the same survey unit as described above for the annual estimates. There are no monthly estimates. Wholesale Trade and Retail Trade develop monthly estimates as does the Manufacturers’ Shipments, Inventories, and Orders (M3) program. Once again, there is a mixture of survey units in the existing programs.

26. Wholesale and Retail use survey units that are similar to the annual survey units – all establishments under a NAICS industry, under common ownership, nationally. Monthly estimates are benchmarked to the Annual Estimates and then to the Economic Census.

27. For Manufacturing, the M3 uses different survey units from those used in the Economic Census and the Annual Survey of Manufactures. *“The monthly M3 estimates are based on information obtained from most manufacturing companies with \$500 million or more in annual shipments. In order to strengthen the sample coverage in individual*

⁹ http://www.census.gov/manufacturing/asm/how_the_data_are_collected/index.html

¹⁰ <http://www.census.gov/services/sas/sastechdoc.html>

industry categories, the survey includes selected smaller companies. The sources from which companies are identified for inclusion in the survey panel are the quinquennial economic censuses (manufacturing sector) and the Annual Survey of Manufactures (ASM). For firms that operate in a single M3 industry category, the reporting unit typically comprises all operations of the company. Most large, diversified companies, however, file separate reports for divisions with significant activity in different industrial areas.”¹¹

28. In addition, there are other estimates produced for annual capital expenditures, business expenses, etc. that are either separate surveys or part of the output surveys. Just at the Census Bureau, there is a wide range of survey units in use. The only time they are the same is in the case of single unit enterprises. Programs use different terminology to describe the survey unit in methodology descriptions and all couch the definition of the survey unit with language that moves the definition from black and white to many shades of grey.

29. Sometimes, it appears that the only consistent unit is the single location enterprise. That concept is clear regardless of the term used to describe the survey unit.

VII. Other Sources of Data Used in National Accounts

30. As noted previously, the United States has a decentralized statistical system. The Bureau of Labor Statistics produces the Quarterly Census of Employment and Wages for all employer businesses and uses the establishment as the survey unit. This comprehensive program also produces a separate business register that is often used to develop other economic statistics including significantly for national accounts, producer price indices used as deflators.¹²

31. The Producer Price Index program uses a variety of survey units described as profit maximizing centers (PMCs). For some industries, this is similar to all units, under common ownership, in the same NAICS industry survey unit used in annual estimates from the Service Annual Survey. In other industries, there are regional or other groupings of individual locations based on the pricing practices in the industry. In any case, there is no guarantee that output statistics on a nominal basis use the same survey units as the price indices that are used to deflate the nominal output.

32. Add in even more variability when considering education statistics produced by the National Center for Educational Statistics, agriculture data from the Department of Agriculture, energy data from the Department of Energy, trade in goods from Census, trade in services from the Bureau of Economic Affairs, and the all important tax data from the Internal Revenue Service and you see both the complexity and beauty of compiling national accounts in the US.

VIII. Example: Retail Trade

33. Economic statistics have many uses. The Census Bureau produces Economic Census data for sales, employment, payroll, product lines and class of customer in Census years for retail trade at the establishment level.¹³ The Annual Retail Trade Survey produces

¹¹ http://www.census.gov/manufacturing/m3/how_the_data_are_collected/index.html

¹² The PPI also uses alternate sources for frames depending on requirements of particular industries.

¹³ Example Economic Census forms for retail accessed at: https://bhs.econ.census.gov/ec12/rt-44-45/rt-44-45_form_default.html

annual estimates for sales, e-commerce, inventories, total purchases, accounts receivable, operating expenses, and interest expenses at the firm or enterprise level.¹⁴ Monthly Retail Trade Survey produces monthly estimates of retail sales at the firm or enterprise level¹⁵. Monthly nominal retail sales levels are a principal economic indicator in the United States and are closely watched by economists and financial markets.

34. The national accounts define the output of retail trade in terms of trade margins rather than gross sales. The national accounts in the US have also used a retail control method for many annual and quarterly estimates of most goods components of PCE¹⁶. Therefore data on both gross sales and trade margins are required.

35. Benchmark Establishment data collected:

- Sales, shipments, receipts, or revenue
- Employment
- Payroll
- Class of Customer
- Product or merchandise lines

36. Annual Firm/Enterprise data collected:¹⁷

- Sales, receipts, or revenue
- E-commerce sales
- Inventories
- Inventory valuation method
- Purchases
- Detailed operating expenses
- Interest expense

37. Monthly Firm/Enterprise data collected:

- Sales, receipts, or revenue
- Inventories (in some cases)
- E-commerce sales (in some cases)

38. The only item that can be benchmarked directly is sales. The most comprehensive data collection in the Economic Census does not provide data on inventories or cost of goods sold at the establishment level or at a consolidated level. These data are necessary elements to determine trade margins. The Economic Census collection is however the only source of data for merchandise lines, class of customer data to allocate intermediate and final demand, and geographic dispersion of units in multi-unit enterprises.

39. The Producer Price Index (PPI) program produces margin based output price indices for retail trade.¹⁸ In most cases, the PPI uses Economic Census weights for five year

¹⁴ Example Annual Retail Trade Survey forms accessed at:

http://www.census.gov/retail/arts/get_forms.html

¹⁵ Example Monthly Retail Trade Report survey forms accessed at:

http://www.census.gov/retail/forms_and_letters/mrts/sm4412s.pdf

¹⁶ Handout National Economic Accounting Class: Fall 2006. NIPA Uses of Benchmark I-O

Accounts. Robert Parker referencing Personal Consumption Expenditures: Methodology Paper 6.

¹⁷ Annual payroll data for retail trade is available from administrative data sources. Employment is not included.

¹⁸ <http://www.bls.gov/ppi/ppimoreretail.htm>

reweighting. Because the information necessary to calculate margins is not available from the Economic Census, PPI uses the sample estimate data from the annual program.

40. There are multiple sources for employment and payroll data for use in non-Census years. These include establishment data from county business patterns or employment and wage data from the QCEW. There are universe differences in those sources due to differences in the source frames.

41. It appears that a single recommended survey unit is not a good idea for retail trade. Ignoring problems with allocation of consolidated data to individual geographic locations there would be considerably less detail available for use if either the establishment or the firm/enterprise was the only survey unit in retail trade.

42. The allocation of consolidated inventory and cost of goods sold data to establishments could be done based on employment or payroll. The most appropriate choice is probably determined on a case by case basis for users. Research into alternative data could also present new ways to identify full information at relatively detailed geographic levels. Scanner data or credit card transactions data are potential sources of granular data. Tax data in the US are generally consolidated and corporate data in required filings and annual reports often use company or enterprise specific reporting categories (e.g., North American operations, Latin American operations or even industrial or consumer products divisions whose outputs can come from the same establishment).

IX. Summary

43. When determining the most appropriate survey unit for developing economic statistics, consideration must be given to the classification being used, the definitions of different types of survey units and perhaps most importantly, what can be consistently collected from a given level in a complex enterprise.

44. NAICS to some extent has softened the definition of establishment by focusing on the lowest level where comprehensive input and output data are available rather than focusing on a single physical location with a dominant activity. In practice, at least for Census Bureau programs, this has resulted in a range of survey units targeted to collection of the variable of interest while balancing the burden that is imposed on respondents.

45. The National Accounts may wish to consider the underlying definition of establishment when reviewing any changes to the recommended unit considering the importance of both records availability and respondent burden. A strong recommendation for a particular unit might convince surveys to use that unit with sub-optimal results. The SNA might also consider providing a list of required details or variables and then target the inquiries to the most appropriate unit based on those needs rather than specifying a particular unit.

Appendix

Actual unit descriptions from selected Census programs

46. **Economic Census:** The economic census is primarily conducted on an establishment basis. A company operating at more than one location is required to file a separate report for each location or establishment. Companies engaged in distinctly different lines of activity at one location are requested to submit separate reports, if the business records permit such a separation, and if the activities are substantial in size.

47. For selected industries, only payroll, employment and classification are collected for individual establishments, while other data are collected on a consolidated basis.

http://www.census.gov/econ/census/help/methodology_disclosure/basis_of_reporting.html

48. **Annual and Quarterly Services:** The estimates are developed using data from a probability sample of firms located in the United States that have paid employees (i.e., employer firms)...To create the sampling frame, we extract the records for all establishments located in the United States and classified in select service sectors as defined by the 2007 NAICS. For these establishments, we extract revenue, payroll, employment, name and address information, as well as primary identifiers and, for establishments owned by multiunit firms, associated EINs

49. To create the sampling units for multiunit firms, we aggregate the economic data of the establishments owned by these firms to an EIN level by tabulating the establishment data for all service establishments associated with the same EIN. Similarly we aggregate the data to a multiunit firm level by tabulating the establishment data for all service establishments associated with the same alpha number. No aggregation is necessary to put single-unit establishment information on an EIN basis or a firm basis. Thus, the sampling units created for single-unit firms simultaneously represent establishment, EIN, and firm information. The sampling frame is a complex amalgam of establishments, EINs, and firms.

<http://www.census.gov/services/sas/sastechdoc.html>

(This is also the basis for the monthly retail and wholesale trade estimates)

50. **Annual Capital Expenditure Survey (ACES):** For single establishment enterprises, the business activity classification is the classification already assigned to its establishment in the BR. For multi-establishment enterprises, business activity classification was assigned based on an examination of its constituent establishments.

51. The employment and payroll data for each of these establishments were gathered using that establishment's assigned 2007 six-digit North American Industry Classification System (NAICS) industry in the BR. The multi-establishment enterprise was then assigned to the economic sector in which it had an active establishment with the most payroll (e.g., manufacturing, construction, etc.). Following that, subsector within that sector, industry group within that subsector, and industry within that industry group were subsequently determined in the same fashion. Each enterprise, multi-establishment and single establishment, once having a 2007 NAICS industry code, was recoded to an Annual Capital Expenditures Survey (ACES) industry code

http://www.census.gov/econ/aces/how_surveys_are_collected.html

52. **Manufacturers' Shipments, Inventories, & Orders (M3):** The monthly M3 estimates are based on information obtained from most manufacturing companies with \$500 million or more in annual shipments. In order to strengthen the sample coverage in individual industry categories, the survey includes selected smaller companies. The sources

from which companies are identified for inclusion in the survey panel are the quinquennial economic censuses (manufacturing sector) and the Annual Survey of Manufactures (ASM). For firms that operate in a single M3 industry category, the reporting unit typically comprises all operations of the company. Most large, diversified companies, however, file separate reports for divisions with significant activity in different industrial areas.

53. The composition of each company or reporting unit of a company in the survey usually includes more than one plant or establishment and frequently includes industry activities outside the M3 category in which it is classified. The survey methodology described later in this chapter assumes that the month-to-month changes of the total operations of the reporting units classified in each industry category effectively represent the month-to-month movements of all establishments that make up the category.

http://www.census.gov/manufacturing/m3/how_the_data_are_collected/index.html

Annual Survey of Manufactures (ASM): Establishment Basis of Reporting

54. The Annual Survey of Manufactures (ASM) is conducted on an establishment basis. Reports are filed for those establishments selected in the sample. Companies engaged in distinctly different lines of activity at one location are requested to submit separate reports, if the plant records permit such a separation and if the activities are substantial in size. Estimates are based on the reports from a representative sample of manufacturing establishments. These estimates represent the portion of the manufacturing population accounted for by establishments with paid employees. Nonemployers are defined as out-of-scope of the ASM with the exception of those that are known to use solely leased employees to manufacture goods. The tables provide estimates for employment, plant hours, payrolls, value added by manufacture, capital expenditures, cost of materials, inventories, value of industry shipments, and fuels and electric energy consumed for most manufacturing industries.

55. The ASM excludes data for central administrative offices (CAOs). These would include separately operated administrative offices, warehouses, garages, and other auxiliary units that service manufacturing establishments of the same company. These data are published in a separate report series.

http://www.census.gov/manufacturing/asm/how_the_data_are_collected/index.html

56. **Enterprise Statistics:** Please note that data are not comparable between survey periods. Please refer to the methodology section of each publication for more information. <http://www.census.gov/econ/esp/methodology.html>

57. For this report, enterprises were classified into the Enterprise Classification System (ECS) sector in which they paid the largest share of payroll. Within these sectors, enterprises were assigned a detailed ECS industry, again based on the industry in which they paid the largest share of payroll. Auxiliary establishments, manufacturers' sales branches and offices, and managing offices (NAICS 551114) were not included when determining enterprise industry classifications, though data from these establishments are included in tabulations. More information about the Enterprise Classification System is available at <www.census.gov/econ/esp/esp07ecstree.html>

http://www2.census.gov/econ/esp/2011/esp2011_report_final.pdf