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Agenda item: 3
Statistical units

Introduction

One of the challenges brought about by the rapidly changing nature of production and particular the ways in which enterprises produce goods and services has cast a spotlight on the SNA's preference for the use of the establishment as the preferred unit to compile industrial statistics, and in particular, supply and use tables. To investigate this issue an ISWGNA Task Force on Statistical Units has been established. This paper provides a concise overview of the main issues related to the choice and definition of statistical units, for inclusion in a future update of the 2008 SNA. . The discussion is first and foremost intended to get some idea of the opinion of the AEG on this topic and the issues that need to be addressed on more depth by the Task Force.

Documentation

Paper: Statistical units

Main issues to be discussed

The AEG is requested to:

- To consider whether the most important issues for the discussion on the choice of statistical units are being listed.
- To suggest additional considerations which may need to be taken into account as well.
- To express their opinion on the importance of the various considerations.

Statistical units

Introduction

The 2008 SNA distinguishes two types of statistical units: (i) the establishment for the description of the production process in the supply and use framework; and (ii) the institutional units for the description of income and finance in the institutional sector accounts.

In both cases, the establishment and the institutional unit, one can observe quite diverging practices across countries. Quite a number of countries use, for example, (an approximation of) kind-of-activity units, enterprises or even enterprise groups as the basic statistical unit underlying their supply and use tables. In the institutional sector accounts, some countries use legal units as the best approximation of institutional units, while other countries apply enterprises or enterprise groups as being equivalent to institutional units. As another example, practices around the recognition of quasi-corporations are also widely diverging. These divergences may be related to practical considerations, e.g. the absence of establishment-level data. But the lack of international comparability is in some cases also governed by diverging interpretations of the (2008) SNA. Whatever the case, it clearly has an impact on the national accounts data, although for some indicators this is more relevant than for other aggregates.

These and other considerations have called for a revisit of the statistical units in the SNA. Below, some of the issues in relation to the statistical unit for the description of the production process are being discussed. The issues around the definition of an institutional unit are not being dwelt upon, although the discussion on the preferred statistical unit in the supply and use tables is in some way related to the preferred unit in the sector accounts. For example, some of the considerations below call for the definition of one statistical unit throughout the whole system of national accounts.

Furthermore, it should be stated upfront that this paper by no means contains a comprehensive listing of all issues at stake. It is first and foremost meant to trigger a first discussion on some of the issues related to the choice of statistical units in the System of National Accounts. Members of the Advisory Expert Group (AEG) on National Accounts are invited to provide additional considerations which they think are important in taking the topic forward.

Why focus on establishments: economic theory and the 2008 SNA

Economic theory describes the production process in terms of production functions. Production functions can be understood to be an abstract description of the technological process of how enterprises (or parts thereof) use inputs of labour, capital (both tangible capital and intangible inputs such as intellectual property products), and intermediate consumption to produce outputs of goods and services. In terms of grouping or aggregating units, economists prefer to group units with similar production functions together. The term ”activity” is often used to convey ideas that are very similar to the term production function. In general, ”activity” can be defined as the combination of actions that result in a certain set of products. Classifications by industry are meant to group units by similar types of activity.

Much of this preference is linked to productivity analysis and the analysis of technological change which are concerned with how goods and services are produced. It is based on similarity of inputs used to create similar outputs, similarities of technologies and production functions. Perhaps economic theory should be kept in mind for any discussion on the appropriate statistical unit for the description of the production

process as it may provide a systematic way to think about the uses of economic measurements, and the implications of those uses for their design.

The 2008 SNA begins with the premise that to appropriately study production and production functions in detail, it is necessary to refer to more homogenous units. "*The ideal solution would be to be able to identify and observe units that engaged in only one production activity. As it is also necessary to give a picture of the distribution of production in space, this unit should also be in a single location or nearby site. ... This unit is the establishment*" (2008 SNA, para 2.38).

The 2008 SNA further defines an establishment as an enterprise or a part of an enterprise that is situated in a single location and in which only a single productive activity is carried out or in which the principal productive activity accounts for most of the value added. Establishments are sometimes referred to as local kind-of-activity units (local KAUs) (2008 SNA, para. 5.14). The SNA goes on to say that if the secondary activities within a unit are important or nearly as important as the principal activity, then they should be treated as taking place within a separate establishment from that in which the principal activity takes place.

Establishments are designed, at least in theory, to be units that provide data that are more suitable for analyses of production in which the technology of production plays an important role. The SNA does, however, recognize that the data may need to be transformed for purposes of input-output analysis (2008 SNA, para 5.16).

When the preference for establishments for industrial statistics was developed the establishment was more likely to be the only site for the entire company. Establishments had considerable autonomy of decision and they were more likely to keep their records in such a way that data could be collected. The preference for the establishment emerged because it was deemed the best way to maintain the link between inputs and outputs at a detailed industrial level as well as having a geographical link to produce regional statistics.

The data and accounts for establishments, needed for the compilation of a full description of the production process, are discussed in para. 5.18 and para. 5.19 of the 2008 SNA:
The only data that can meaningfully be compiled for an establishment relate to its production activities. They include the following:

a. The items included in the production account and the generational of income account;
b. Statistics of numbers of employees, types of employees and hours worked;
c. Estimates of the stock of non-financial capital and natural resources used;
d. Estimates of change in inventories and gross fixed capital formation undertaken.

The compilation of production account and generation of income account implies that it must be feasible to calculate output, intermediate consumption and thus value added and also compensation of employees, taxes on production and imports, subsidies and the operating surplus or mixed income. In principle, it must be feasible to collect at least the above kinds of statistics for an establishment even if they may not always be available, or needed in practice.

Feasibility of data at the establishment level

When it comes to the discussion on the preferred statistical unit, an important question relates to the feasibility in practice to collect all the relevant information at the establishment level, as discussed in paragraphs 5.18 and 5.19. As stated earlier, from the viewpoint of a production-oriented concept, the collection of inputs (compensation of employees, materials and services used in production, capital)

linked with outputs is essential. In this case, the appropriate statistical unit is somewhat determined by the availability of information on the inputs that are important to production.

The allocation of inputs in the case of multi-establishment enterprises: theoretical considerations

From a more theoretical point of view, one can state that the establishment may no longer be the relevant unit for production analysis, if the establishment is not the decision unit and/or if business services or other essential inputs cannot be allocated uniquely to establishments. The increased fragmentation of production (both domestic and foreign) undoubtedly seriously complicates the proper allocation of various corporate and/or ancillary services provided or purchased at a centralised level of the enterprise (group). The same holds for the increasing use of capital services related to intangible capital, such as R&D, software and databases. More generally, in the absence of appropriate market prices for inter-establishment transactions in goods and services, one can question the possibility to appropriately account for the operating surplus generated at the establishment level.

The allocation of inputs in the case of multi-establishment enterprises: practical considerations

In many countries, one can observe a change from collecting survey data to the use of administrative records. This is mainly motivated by the increasing pressure to reduce the respondent burden on enterprises. However, administrative registers typically do not relate to establishments, but rather to enterprises or legal units. Also when it comes to surveys, there is a noticeable shift towards collecting data on an enterprise basis, rather than on an establishment basis. The latter is amongst others caused by the fact that it has become increasingly difficult for enterprises to provide statistical offices with data on the basis of establishments. In addition, while some argue that industrial statistics collected at the establishment level for certain industries such as manufacturing or restaurants may still be appropriate, even countries that collect data at an establishment level increasingly find it difficult to collect information from enterprises in the service sectors or from smaller multi-establishment firms because they do not maintain adequately detailed records at the establishment level. In fact, from a 1990 U.S. Census Bureau report, 89% of companies maintain records at a unit level somewhere between the establishment and the enterprise or company. There are many different terms for sub-company level reporting; it could be division, department, or subsidiary. The U.S. Census Bureau found that some enterprises' input data are more readily available at the division level than at the establishment level.[1]

In summary, when applying the same statistical unit concept to all statistics related to the production process, the establishment may not be the best unit, because it may not be conceptually appropriate to make that distinction and/or it may not be possible to collect the relevant data at the level of establishments in practice.

Regional accounts

An issue related to the above concerns the need to compile national accounts data by region: regional accounts. It goes without saying that the existence of multi-regional enterprises creates a problem in allocating economic activities to regions, and one would preferably have data at the establishment level. However, one also needs to question what data are actually available at the local level. In this respect, the issues have much in common with the problems that are to be solved when compiling data for (relatively) homogeneous industries. Can we actually allocate corporate services, including capital services and operating surplus, to the respective regions, in order to arrive at an approximation of the input structure?

[1] Bureau of the Census, Proceedings, International Conference on Classification of Economic Activities, Williamsburg, Virginia: U.S. Department of Commerce, November 6-8, 1991, page 192.

How much does establishment level data add to the quality of regional data? And are there alternative ways of estimating relevant indicators, instead of having a full-scale application of establishments? In this respect, an important consideration for the choice of the preferred statistical unit is which regional indicators are predominantly used and thus need to be compiled. The answer may differ depending on whether one only needs to compiled some aggregate indicators (value added, employment, etc.) or a full-fledged regional supply and use table.

Assumption of homogeneity

One of the primary motivations for the SNA's preference reflected the view that establishments classified to the same industrial classification grouping shared similar characteristics in their outputs and related production functions, and, so, were considered broadly "homogeneous". This may have been the case when the SNA was first set up, but the economic developments over the last decades have clearly weakened this underlying assumption. The growing share of output generated by foreign affiliates, rapidly changing products, the flexibility in the production process through the increased use of outsourcing (both foreign and domestic) and new types of producers makes one question just how homogenous the units classified within any given industry are. Under the current classification into industries, contractors (i.e., units carrying out an activity on a fee or contract basis) are classified in the same ISIC category as units that are producing the same goods or services for their own account. In addition, foreign controlled enterprises and domestically controlled enterprises are grouped together. Thus, the input structure of units producing similar types of products may be quite different across these various types of producers.

In respect of the above, one may also need to consider the interpretation of developments over time. In a certain way, (homogeneous) activities pre-assume continuity over time of the production process, to arrive at meaningful indicators of growth by activity. However, a world with rapid changes in products, production processes and/or organisational arrangements calls into question what exactly we measure or want to measure.

<u>Kind-of-activity units and homogeneity</u>
One may argue that maintaining a link between inputs and outputs at a detailed industrial level may best be done by applying to concept of kind-of-activity units and not the establishment concept. The SNA defines a kind-of-activity unit as "an enterprise, or a part of an enterprise, that engages in only one kind of productive activity or in which the principal productive activity accounts for most of the value added" (2008 SNA, para 5.12). Thus, there is no restriction on the geographical area in which the activity occurs which may be an issue if full-fledged regional supply and use tables are constructed as discussed above.

The aim of creating kind-of-activity units is to maintain homogeneity as much as possible, while conceptually and practically it may be slightly easier to allocate some of the intangible inputs (e.g., R&D) if these inputs are tied to a certain activity of the enterprise. On the other hand however some of the same issues may occur as with establishments, i.e. the inability to allocate various corporate and/or ancillary services provided or purchased at a centralised level of the enterprise (group). Thus similar questions arise on the ability to collect appropriate data. Also, it may be difficult to indicate how far splitting an enterprise should go, thus hampering cross country comparability.

Derivation of symmetric input-output tables

Supply and use tables and input-output tables provide the most detailed description of the production process. Usually, the compilation of data on the production process starts with the balancing of supply and demand of goods and services in a supply and use framework. From a purely statistical point of view, supply and use tables are perfectly equipped to deal with heterogeneity. However, for certain types of

analysis (multiplier analysis, Trade in Value Added, ecological footprints, etc.), one would need symmetric input-output tables that describe the production process for purely homogeneous industries producing a single homogeneous product. These tables are typically derived from supply and use tables. In the case of more heterogeneous supply and use tables, additional assumptions need to be made to allocate intermediate consumption and labour inputs to the primary and secondary outputs produced in a certain industry. It may therefore be important to investigate the actual increase of heterogeneity when applying, for example, enterprises instead of establishments as the underlying statistical unit. In looking at the pros and cons, one should also take into consideration the potentially higher quality of (more detailed) supply and use tables based on enterprises. Furthermore, one should consider the potential of a more targeted surveying of some of the large and more heterogeneous industries.

Change of emphasis from the physical view of input-output to an economic view

The changes adopted in the 2008 SNA for the treatment of goods for processing reinforced the need to consider whether establishments should remain the unit of preference in the System of National Accounts. It was at least in part as a consequence of these changes, and those pertaining to the ownership issue more generally, that led to the inclusion of the issue of establishments on the research agenda in the 2008 SNA (para. A4.21): "*At the present there are two reasons to have the concept of establishment within the SNA. The first of these is to provide a link to source information when this is collected on an establishment basis. In cases where basic information is collected on an enterprise basis, this reason disappears. The second reason is for use in input-output tables. Historically, the rationale was to have a unit that related as far as possible to only one activity in only one location so that the link to the physical processes of production was as clear as possible. With the change of emphasis from the physical view of input-output to an economic view, and from product-by-product matrices to industry-by-industry ones, it is less clear that it is essential to retain the concept of establishment in the SNA*". Although the SNA 2008 did retain the current preference for establishments, the above stresses the need for reassessing the use of these statistical units in the light of new economic phenomena.

More generally, one starts to wonder what, in the present-day economy, is more relevant for economic analysis: a more detailed industrial breakdown along the lines of the primary products produced, or to take into account, for example, ownership criteria in splitting up the description of the production process. In the case of the latter, the first thing that comes to mind is a breakdown of industries into public corporations, foreign controlled corporations (or corporations being part of a much larger group, either or not being a multinational enterprise) and other private enterprises. The use of the enterprise as the statistical unit would most certainly facilitate such a breakdown, although it would not be impossible to do the same in the case of establishments.

Integrated analysis of production, income and finance

Looking at the economic view more generally, it has become increasingly important to describe economic developments in a broader context. A very important linkage in this respect is the link between the "real" economy and the "financial" economy. Using corresponding statistical units in the supply and use tables and the institutional sector accounts would allow for a far better integration of the description of producing goods and services and the description of income and finance. Considering the increased role of income and finance in recent decades, in particular showing up during the economic and financial crisis, such integration could significantly benefit research and policy. Also, for example, the impact of trade and activities of multinational enterprises on income and finance could be analysed in much more detail. If one, for the above reasons, would prefer to have one statistical unit underlying both supply and use tables and institutional sector accounts, it goes without saying that the logical choice is the enterprise, as much of the information needed to compile institutional sector accounts is simply not available at the establishment level.

Advantages of linking

The significantly growing potential of ICT-tools to manipulate large amounts of data has also increased, and will continue to increase, user demands for very detailed analysis in which statistics on production of goods and services are linked to statistics on enterprise characteristics, foreign (affiliate) trade, employment, etc. The current use of the establishment in the supply and use tables makes it difficult to properly link the data as information on these phenomena are typically only available at the enterprise level. Therefore, the use of a statistical unit that is more in line with the units from which these types of data are being collected may help describe these developments in relation to one another. These linking possibilities may also enhance the compilation of consistent macro-economic statistics per se.

Considerations of efficiency and flexibility

More generally, removing the preference for establishments and trying to better link to corporates' own business accounting frameworks may not only reduce reporting burdens for respondents, but it may also reduce statistical burdens for national statistical offices. These can be very important considerations in view of the continuing pressure on statistical budgets and the increasing pressure to reduce the respondent burden for enterprises.