

Economic Classification Policy Committee

Issues Paper No. 1

Conceptual Issues

At the 1991 International Conference on the Classification of Economic Activities at Williamsburg, Virginia ([1], hereafter, "Williamsburg Conference"), many participants stated that economic classification systems, including the U.S. Standard Industrial Classification (SIC) system, need to be based on economic concepts, or need an improved conceptual foundation. This call for an economic concept was a major departure from recent past discussions of economic classifications.

Classification Systems

Many economic classification systems exist. All of them group economic data.

Some classification systems group individual transactions. The Harmonized Commodity Description and Coding System (HS), for example, groups individual international trade transactions into product-code groupings for tariff and trade negotiations. The Census Bureau "7-digit" product codes group the value of shipments of individual manufacturing products. In principle, such groupings could provide an exhaustive list of the commodities and services produced in the economy (though in practice, even the most detailed codes must combine commodities that differ to an extent).

Other classification systems group or aggregate producing units into industries. The U.S. 4-digit SIC codes are an example of such an industry system. The SIC system also aggregates the 4-digit industries into higher level aggregations, the SIC 3-digit and 2-digit industry groups. The International Standard Industrial Classification of all Economic Activities (ISIC), of the United Nations, is another industry classification system.

Many of the most difficult issues of classification systems concern the principles for forming industry aggregations. For this reason, Issues Paper No. 1 focuses its attention on these conceptual questions.

Questions concerning the grouping of "industries" or other first-level aggregates into higher-level aggregates are discussed in Issues Paper No. 2. Issues in forming the product- or commodity-level detail itself are discussed in Issues Paper No. 8. However, the topics discussed in Issues Papers Nos. 2 and 8 are closely related to these addressed in Issues Paper No. 1, and for this reason Paper No. 1 is crucial for the other two.

1.1 The Purpose of an Economic Classification System

To those most familiar with economic classifications, their purpose may seem obvious. Yet, an explicit statement of purpose—the underlying objective of a

classification system—is essential for many of the topics discussed in the Economic Classification Policy Committee (ECPC) issues papers.

The literature on economic classifications presents several general answers to the question of purpose. In all of the following, some listing of detailed commodities and services is presumed to exist, and the discussion concerns the formation of some first-level aggregation system, that is, an SIC industry, or some analogous or similar aggregation.

(a) To facilitate use of the data

For many analyses, economic data are grouped in order to reduce the amount of unmanageable detail. When detailed commodity data are available, some users will prefer to group the data for themselves. Other users, however, prefer that statistical agencies group the data into product or industry categories, either because of the expense of doing it for themselves or because they may lack the expertise to group data for their purposes. A standardized grouping, or classification, system is therefore a service to the data user and provides a valuable reference point even for those users who decide they wish to depart from the standard system in some way. In addition, microdata are not always available, because of confidentiality, sampling considerations, or other reasons; in these cases, statistical agencies must provide data in grouped formats.

In past approaches to classification, the objective has been to find a general purpose classification system that will meet all major user needs, or provide the maximum accommodation to the variety of needs for data. In the earliest U.S. economic classifications, different statistical agencies adopted their own systems, presumably in part because each agency's system was tailored to a specific statistical agency purpose or objective. Because many analyses require economic statistics produced by different agencies, demand arose for a *standard* classification system that would render all statistical agency outputs comparable, yet meet in some manner the specific purposes for which individual classification systems had been developed previously.

What seems new in the Williamsburg Conference is the view that, though standardization across statistical agencies should be maintained, different standardized classification systems corresponding to different uses of economic data may be needed. These uses, in a kind of short-hand expression, may be divided into "supply-side" or "production-oriented" classification systems versus "demand-side" or "commodity-oriented" classification systems (see the development of these terms in section 1.2, below).

(b) Structure of the economy

Frequently encountered in the economic classification literature is the statement that the classification system should "reflect the structure of the economy." Joseph Duncan commented that "A good classification system . . . need[s] to reflect the current structure of the economy in order to assist in analysis of important changes" (Williamsburg Conference [6], pp. 19–20), and other participants expressed similar views. It is often remarked that the structure of the economy provides a kind of snapshot view of the economy at one time, which implies that time series will show how the structure changes.

Unfortunately, the term "structure of the economy" has not been well defined or explained. In one view, the structure of the economy encompasses what industries exist, where they are located, what inputs they use, what outputs they produce, and what markets they serve. Yet, the current (1987) U.S. SIC may not adequately indicate the industries that exist: Three-fifths (574) of the SIC 4-digit industries are goods producing (of which 459 are manufacturing), while the remaining two-fifths (430) 4-digit SIC's relate to the entire nongoods producing sector. The U.S. nongoods producing sector is larger than the goods producing sector by most measures. It has often been stated that the distribution of current SIC 4-digit industries does not seem to reflect the structure of the economy.

Another definition of the structure of the economy refers to the organization of production units for marketing goods or services, including the degree of vertical integration. For example, two separate meat processing industries are recognized in the current SIC (2011, Meat Packing Plants; and 2013, Sausages and Other Prepared Meat Products). The two produce virtually the same output, meat products, but meat packing plants slaughter the animals that they use in the production of meat products, while the sausage and other prepared meats plants produce meat products from purchased carcasses and other meats. As the meat packing example illustrates, the degree of vertical integration is sometimes recognized as an aspect of structure in the current SIC. In other instances, differences in vertical integration are ignored, e.g., Poultry Slaughtering and Processing (SIC 2015), where slaughtering and processing are combined regardless of whether or not the producer actually slaughters the poultry.

Moreover, the SIC system has been criticized for reflecting changes in vertical integration, when in some sense or for some purposes it should not. Conflicting statements and differences in treatment in the present system suggest the need for a more coherent statement of how vertical integration is to be treated in economic classifications.

A third example of structure concerns the combination of activities. The Hotels and Motels (SIC 7011) industry encompasses many distinct economic activities. For

example, a hotel generally includes a restaurant, bar, the rental of rooms, a gift shop, etc., some of which exist separately in other 4-digit SIC's. In the U.S. SIC, the structure that is embedded in the SIC hotel industry pertains to the combination of related economic activities. In some other countries, classification systems distinguish between hotels that serve food and beverages and those that do not. Structure in the sense of this example thus admits to alternative interpretations.

Another criticism of the current SIC system structure is that new or emerging industries are not recognized very rapidly. Thus, the present system lags in recording these kinds of changes in the structure of the economy.

(c) For use in sampling

Most statistical programs are based on sample surveys. The requirements of sample surveys provide another reason for developing economic classification systems.

Samples may not be large enough to support estimates at the detailed commodity level or even at the 4-digit industry level of detail. Classification systems have traditionally determined how commodity detail will be collapsed for sampling purposes into more aggregated estimates, such as 4-digit, 3-digit, or 2-digit industries. For some statistical surveys, sampling at the commodity-detail level may not make sense: Because they are produced jointly, one cannot collect wage and employment information for granulated sugar or for molasses, for example, though labor information for sugar products is both collectible and useful. The sampling process often requires stratification by relevant economic variables, among which are the variables employed in economic classification systems. Both sample frame development and estimates from sample surveys thus depend on economic classification systems.

(d) Comparability

The expressed purpose of the U.S. SIC system is to ensure that industry statistics provided by various agencies are comparable and consistent across agencies. Comparability is crucial because the U.S. system is decentralized. However, even if the system were centralized, comparability across surveys would be required: One might want, for example, to use data from labor market surveys in the same analysis with information on product sales or receipts.

Similarly, if one wants to draw comparisons among different countries, it is important that data be collected and reported on some standardized basis. The National Academy of Sciences ([14]), emphasizes the importance of comparability between international trade data and data on domestic production.

One can thus conceive of a classification system as a device for organizing in a comparable way data sets produced from different surveys, or by different statistical agencies, or by statistical agencies in different

countries. Reg Ward (Williamsburg Conference [27], pp. 88-9) speaks of a classification system promoting "communication" among data sets.

The Committee's Position

This section lists four possible purposes for a classification system. For the reasons set out in the following, the Committee believes that the first of the four—facilitating the use of economic data—should be the primary purpose of an economic classification system.

Comparability is clearly necessary for a classification system to be useful. It is also clear, however, that comparability is not sufficient, and one must look beyond comparability to specify the purposes of a classification system. The SIC system serves to make data produced by different U.S. statistical agencies comparable, but comparability has not precluded extensive criticism of it. Criticism of the U.S. SIC implies that users are concerned with the utility or usefulness of an economic classification system, beyond its provision of comparability. Shaila Nijhowne (Williamsburg Conference [15], p. 560) drew attention to the fact that "We have come a long way since the Standard Industrial Classification was used simply to achieve data comparability between federal government departments, for a limited number of data series. The SIC's now serve a multiplicity of needs." In the Committee's judgment, comparability must be coupled to the requirement that classification systems be designed so that they meet user needs. Adopting some existing system merely because it provides comparability is not consistent with the Committee's charge to conduct a "fresh slate" examination of economic classification systems.

Survey use—providing a statistical framework for collapsing product and industry detail when conducting sample surveys—is an important reason that statistical agencies develop and maintain economic classification systems. The sampling use of classifications focuses attention on the ultimate purposes for which the data are used, because the data programs for which samples are selected have themselves differing ultimate uses. A classification system that is used to facilitate drawing samples needs to be consistent with the purposes for which samples are drawn.

The Committee recognizes the long tradition that states that classifications systems are intended to portray the structure of the economy. There is validity in many complaints that the current system does not portray the structure of the economy (its failure to record emerging industries soon enough, for example). However, the phrase "structure of the economy" seems to mean different things to different users, perhaps because they have differing analyses in mind when they discuss structure. If so, the elements of structure that matter for one use

of SIC-grouped data are not those that matter for another use, and may even conflict. In a event, ambiguity in the use of the term suggests the need for a more rigorous definition of "structure," one that could be applied consistently across all the industries in the classification system.

Request for Comment

The Committee invites comments on the foregoing discussion, particularly its view that data use provides the primary rationale for an economic classification system.

1.2 The Idea That an Economic Classification System Should be Based on a Consistent Conceptual Framework

At the Williamsburg Conference, there was widespread recognition that the present U.S. SIC system does not correspond to any single concept for grouping or aggregation. Critics of the present system suggest that the absence of a consistent conceptual framework creates anomalies within the system. Particular concern was also voiced at the Williamsburg Conference that there is no discernible concept in the services categories: "In general, there seems to be no consistent definition or classification concept underlying decisions on what to include in services or on how to arrange the categories within services. The resulting conglomerate is too diverse to be analytically useful" (Courtenay Slater, Williamsburg Conference [20], p. 150).

On the other side of this issue are those who, while recognizing the validity of many of the criticisms of the current system, question use of a single concept for constructing a classification system. They believe that classification systems must incorporate multiple concepts, both because industries are actually organized on varying principles, and because classification systems must be the source of data for different types of analysis.

The following section explains the economic concepts that have been proposed for economic classifications. The positions taken on the concepts question and the issues that arise under it are reviewed in the subsequent sub-section.

Background: Economic Concepts for Classification Systems

Proponents of adopting a consistent conceptual framework for economic classifications have focused on two alternative general approaches, which may be referred to as the supply-side approach and the demand-side approach.

A supply-side, or production-oriented, concept aggregates according to similarity in the production processes that are used to make them. In the technical language of economists, one would group establishments together if each establishment has the same or closely similar production function.

A demand-side, or commodity-oriented, classification concept, in contrast, yields a

classification system based on use of the commodity or service. Commodities or services that serve similar purposes, that are used together, or that are functionally related in use, are grouped together.

Both general approaches—supply-side or demand-side—are derived from economic theory, specifically the economic theory of aggregation. The conceptual approach to economic classifications is developed in a paper by Jack Triplett [23] that was published prior to the Williamsburg Conference. That paper contains more information on the conceptual approaches described in the following paragraphs.

The Supply-Side or Production-Oriented Concept

For the purposes of this paper, the technical term production function needs more explanation and needs to be related to other terms that have been employed in the classification literature.

Production involves an activity in which inputs are used to fabricate some material good or to render a service. A production function describes how the amount of the product (or service) depends upon all the inputs used in its production, given the state of the art, or "technology." All of the inputs matter, not just the major input (e.g., leather or plastics). The list of inputs includes in principle the types of labor and their skills, the types of capital equipment, as well as intermediate materials, and, in many cases, intangible inputs may be important, especially in the production of services. The substitution of one input for another is inherently part of many production processes, and that information, too, is incorporated into the production function. The production function should be understood as an abstract description of the engineering principles for a production process, or as a description of the production technology, and not just a list of inputs. In principle, it is engineering information about the production process that determines if establishments are sufficiently similar to justify grouping them by a supply-side concept.

In the international literature on classifications, the term "activity" is used to convey ideas that are very similar to the terms production function or production process, as these terms are used in ECPC issues papers. Peter Struijs (Williamsburg Conference [21], p. 367) remarked: "... [C]onstructing an SIC is to define similarity of businesses. As the SIC is used for the statistical description of the production process as carried out by businesses, it is the kind of economic activity of businesses that determines their similarity." Struijs then goes on to note several possible "criteria" of classification, one of which is: "The production process criterion refers to the way in which inputs are transformed into outputs. This depends mainly on the technology used" [ibid., pp. 368-9].

Similarly, the usage of the term "activity" in the International Standard Industrial Classification (ISIC), Rev. 3, of the U.N. Statistical Office [24] is also consistent with the meaning of the production function term, as used in the ECPC issues papers: "... [T]he term 'activity' is to be understood as a process, i.e., the combination of actions that result in a certain set of products. In other words, an activity can be said to take place when resources such as equipment, labour, manufacturing techniques or products are combined, leading to specific goods or services. Thus, an activity is characterized by an input of resources, a production process and an output of products" (ibid., p. 9, para. 29). The following example from the same source is illuminating: "If, for example, pens and pencils are produced in the same enterprise, using, however, different inputs and different production techniques, the enterprise may be considered to carry out two activities..." (ibid., para. 32). Although the ISIC use of the term "activity" is consistent with the production function concept, this does not necessarily imply that the ISIC in practice actually implements a supply-side concept.

The Demand-Side or Commodity-Oriented Concept

The demand-side concept is more intuitively understandable than is the supply-side concept, but, at the same time, is technically more difficult to define. Under a demand-side concept, one would group together commodities or services that have similarities in use, that belong together or are used together for some purpose, or that define market groupings.

A quite old idea is that demand groupings can be formed by considering the nature of substitutions. Very close substitutes belong together; commodities or services that are not good substitutes belong in different categories. Granulated cane sugar and granulated beet sugar, for example, are probably indistinguishable in use (they are perfect substitutes) and accordingly belong together on the close-substitutes rule. The close substitutes method is sometimes known as the "gaps in nature" approach: To define demand-side categories one looks for pronounced gaps in the chain of substitutes. Empirically, finding gaps in the substitute chain has proven difficult.

A somewhat related idea is examining the movement of prices. If the prices of two goods move together, then they may be combined in a demand-side category. This is often known as "Hicksian aggregation," because it appeared in the work of Nobel laureate Sir John Hicks. The products granulated cane sugar and granulated beet sugar probably conform to Hicksian aggregation, because it is difficult to comprehend how the prices of such close substitutes could differ. Hicksian aggregation has the advantage that it can be examined

empirically using available government price indexes: One study by Theodore Jaditz [10], for example, employs detailed Producer Price Indexes to determine if conditions for Hicksian aggregation are met.

Demand relationships extend beyond close substitutes or goods whose prices move together. Cases where commodities are used together need to be included in a demand-side concept. Such relationships are sometimes called "Leontief" aggregation (from the work of another Nobel prize-winning economist, Wassily Leontief): Demand-side groupings can be formed from goods that are used in fixed relation to one another.

Still more general is the demand-side aggregation known as "functional aggregation." In this case, one aggregates commodities if demand patterns among them—whether substitution or joint use—are independent of the use of other commodities. The technical condition is that demands for commodities included in a group should depend only on the prices of commodities within the group, and on consumer income (in the case of consumer goods). This form of demand-side aggregation imposes conditions that are highly technical, and that are not easy to explain in intuitive language.

Another approach to demand-side groupings is to consider marketing relationships. If commodities are commonly sold together through similar channels, some users will request that information on them be combined. One example appears to be "Hand and Edge Tools" (SIC 3423), which groups together most of the tools found in a typical hardware store.

From this discussion, it may be understood that one technical problem inherent in applying a demand-side concept for classifications is that the alternative demand-side rules noted above will not necessarily yield the same groupings.

Additional Discussion

The classification of sugar products is an old example that illustrates some of the differences between supply-side and demand-side conceptual bases for aggregation or grouping. The present U.S. SIC distinguishes granulated sugar (as well as molasses and other sugar products) made from sugar cane and puts these sugar products in a different industry from the same sugar products that are produced from sugar beets; sugar products that are made from raw cane sugar are yet another separate industry (these three industries are, respectively, SIC's 2061, 2063, and 2062).

One could argue that the present SIC grouping makes sense as a supply-side or production-oriented concept, on the grounds that sugar cane and sugar beets require different production processes in the sugar refinery, and that refining of sugar from purchased raw sugar also implies a difference in the production process (because the first stage of processing will be absent in these

latter establishments). If sugar production processes are adequately distinguished by the groupings in SIC's 2061, 2062, and 2063, then this supply-side grouping of sugar products is appropriate for the analysis of production processes for sugar, the analysis of productivity in sugar production, and so forth. For production and productivity analyses, an economist wants the data grouped so that they represent similar production processes, and does not want the data grouped by similarity in use of the product.

The present SIC grouping of sugar products does not, however, conform to a demand-side grouping concept. Granulated sugar produced in SIC 2061 is probably indistinguishable in use from the granulated sugar that is produced in SIC's 2062 and 2063, and the same statement undoubtedly holds for powdered (icing) sugar, or molasses. No matter the raw material from which they are made or the process used for refining, there is little evidence in the marketing or use of sugar that any attention needs to be paid to the production processes distinguished in the present 4-digit SIC's.

The distinction between supply-side and demand-side classification concepts is sometimes identified with the distinction between an industry classification system and a product or commodity classification system.

A commodity classification system aggregates only commodities—that is, only the outputs of the collection unit are aggregated, and not the inputs. If only the outputs are aggregated, one could group molasses, say, wherever produced into a single commodity group, and place it, if appropriate, in a completely different category from granulated sugar. A demand-side, commodity, classification system is not limited or constrained by the necessity for grouping inputs (capital equipment, employment, or materials used) along the same lines.

An industry classification system, on the other hand, must be capable of grouping both establishment outputs and inputs by the same system. In a supply-side classification system, putting molasses and powdered sugar into different categories would not be feasible. Neither the labor inputs, nor the machinery, nor the sugar cane or sugar beet inputs can be allocated uniquely to molasses or powdered sugar.

Another similar distinction is the one between industry and market. James McKie [13], writing nearly 30 years ago, noted that economists frequently assume that the limits of the industry and the market coincide: "Marshallian economics envisioned a structure of single-stage industries producing single products. For analytical purposes, the boundary of the industry is still usually assumed to be the same as the boundary of the market. . . . But such a concept is too simple to serve as a framework for statistical reporting." If industry and market boundaries coincide, then the conceptual questions in

classifications will have little practical importance—one will obtain similar groupings whether supply-side or demand-side aggregation concepts are employed. Generally, the industry and the market do not always coincide, which means that supply-side and demand-side groupings may well differ.

In some of the discussion at the Williamsburg Conference, the distinction between product and industry classification systems was not clearly maintained, or the distinction was not drawn as it has been in the present paper. Some of the participants envisioned a demand-side aggregation, a market-oriented commodity classification system that would also collect data on inputs, and so could be used simultaneously both for market analysis and for production analysis. This vision is, of course, precisely the historical goal of the current SIC system—to construct a classification system that can simultaneously meet the demands of all uses of economic data.

1.3 What Grouped or Classified Data Do Users Need?

Though statistical programs must always be adapted to user needs for data, statistical agencies sometimes find it difficult to stay abreast of evolving uses of statistics because data needs change, and sometimes they change quite rapidly. Determining actual and potential statistical uses of classified data, and the major users of classified data, is particularly difficult. Data classification systems affect the programs of nearly all statistical agencies. Within the decentralized U.S. statistical system, there is no single place to which information on the uses of classified data flows.

One view expressed at the Williamsburg Conference holds that uses of classified data can be separated into supply-side analyses or uses of data and demand-side analyses or uses of data. Use of grouped data for marketing studies, for example, is generally a demand-side use, because marketing studies require that data be grouped by use patterns or by patterns of close substitutes. Production analysis or productivity studies are supply-side uses, because they require grouping by similarity of production processes.

It is not clear, however, that these distinctions between supply-side and demand-side uses were developed out of a sophisticated and comprehensive overview of user requirements for classified data. The distinctions seem to have been drawn, instead, from the distinctions made in economic theory, combined with generalized discussion of how the data might be used. But even if the theoretical distinctions are entirely the relevant ones, the Committee would still need to compile information about major uses to determine which of the groupings that are derived from economic theory are the most relevant ones for the major uses of the data.

A survey of uses of economic data is particularly difficult in this case. Tabulations of inquiries to statistical agencies (see the table in Tom Petska, Fritz Scheuren, and Bo Wilson [16], p. 57) are generally useful, but are not practical for gathering information on classifications. Files of complaints from users about aspects of past classification systems have been built up, more or less on an anecdotal basis, but these files never have been assembled in a way that relates them systematically to major uses of classified data. Samples drawn from statistical agency mailing lists may also fail to reach the appropriate audience because many users of statistical agency data are not on agency direct mailing lists.

The Committee's Position

The Committee believes that more information about user needs for classified data must be assembled, regardless of the difficulties.

Request for Comment

The Committee invites comments from users, especially on the uses they make of classified data. Particularly relevant to the Committee's deliberations is information on problems with existing (SIC) classified data in serving user needs, especially analyses that are inhibited by inadequacies in existing classifications. The Committee also invites comment on the view that major uses of classified data can themselves be grouped into supply-side or demand-side categories for the purpose of the Committee's investigation.

1.4 Should Classification Systems Conform to a Consistent Conceptual Framework?

Whether economic classification systems should conform to a consistent conceptual framework brought forth a number of views, of which the following are the major contending positions.

(a) A single economic concept should be applied consistently throughout an economic classification system

The view that economic classifications require a conceptual framework drawn from economic theory was endorsed by a number of participants at the Williamsburg Conference, including Joel Popkin [17], Frank Gollop [8], Marilyn Manser [11], Ernst Berndt [3], Jack Triplett [22], and Cardiff, Kokaski, Smith, and Zieschang [4].

The case for a single economic concept for economic classifications has several interrelated parts.

- Without a consistent economic concept for grouping and classifying data, users will find that the data are not always grouped appropriately for any purpose. Inconsistencies arise in the system, and users may not know where they are. The present system contains examples. Sugar products are grouped by the supply-side concept into three separate SIC's

because of differences in production processes. However, some other products (such as Hand and Edge Tools, SIC 3423, or Musical Instruments, SIC 3931) that are produced by different production processes are grouped into a single industry by what appears to be a demand-side concept. Similarly, presumably a demand-side concept justifies separating timeclocks and time recording devices (which are placed in SIC 3579, Office Machines, Not Elsewhere Classified) from the clocks and watches industry (SIC 3873).

- Equally important, without a consistent economic concept, whoever constructs a classification system must inevitably choose from among competing requirements. Lack of a consistent underlying concept may lead to arbitrary decisions or decisions that seem arbitrary, and may cause unnecessary reclassifications among 4-digit categories (see Edward Denison [5] for the position that SIC reclassifications have made economic data less useful).
- In presenting the system to the public, an economic concept facilitates explaining why data are grouped in one way rather than in another. Without a consistent concept, the system as a whole cannot be understood by users, which leads not only to inadvertent misuse of the data, but also to controversies and criticisms that arise from misunderstandings. The system needs a consistent concept to provide a coherent framework for criticizing the system in order to improve it.
- If the multiple uses of economic data cannot be accommodated within one conceptually consistent system, then the solution may be to create multiple classification systems, each one conceptually oriented toward a particular use of the data. At minimum, this would entail an industry classification system based on a supply-side concept and a commodity classification system based on a demand-side concept. Constructing a single classification system that is intended to accommodate all uses creates, on this view, too many compromises, so that data produced under the system do not meet user needs.

(b) **The system needs concepts, but a single concept may not be either desirable or feasible**

Others believe that the classification system must provide multi-purpose statistical groupings and that there can be no single underlying concept. Accordingly, the system must be a balance, and a compromise if necessary, among competing requirements for data.

This view notes that the multiple concepts embedded in the current U.S. SIC are dictated by the fact that in the economy some units are organized on the basis of inputs or

production (e.g., Aluminum Die-Castings, SIC 3363; and Cotton Textile Finishers, SIC 2261) and others on the basis of marketing patterns or uses (e.g., Hand and Edge Tools, Except Machine Tools and Handsaws, SIC 3423; and Dolls and Stuffed Toys, SIC 3942). The defenders of the current U.S. classification system suggest that requiring the system to conform to a single concept may result in data that are less useful, accurate, and comparable across time and among agency programs.

The current SIC system attempts to implement concepts to the extent permitted by establishment input and output patterns. Widespread emphasis is given in the current SIC to products, market categories, and stage of processing. Economic concepts may have provided guidelines but they did not define a standard.

This system has been criticized because in application it results in inconsistencies of concept. But those who question the acceptability of a single concept state that these apparent inconsistencies exist because of variations in output patterns in the economy which result in groupings that are not conceptually consistent. In this context, inconsistency is a valid criticism only if consistency is the major objective of the classification system.

Many advocates of the current system point out that the units of some current SIC industries cannot be grouped according to a demand-side concept. For example, as noted above, the aluminum die-castings industry (SIC 3363) is currently categorized on the basis of the material used and the production process. Aluminum die-castings establishments produce an unlimited range of products, the mix of which can change from year to year or week to week. From a practical standpoint, the establishments may not even maintain records by product. If these establishments were to be classified on the basis of outputs, it would be difficult to obtain accurate data, diminish the stability of classification over time, and lessen agreement among agencies in their classifications.

This view recognizes that both production process and outputs are important in a classification system. A grouping, however, should not be based exclusively on the production process if that results in grouping outputs that are highly dissimilar in use. There is probably little similarity in the production processes for pianos, piccolos, and ocarinas, but that does not mean that the musical instruments industry (SIC 3931) ought to be separated along production process lines.

Under this view, the mixing of concepts in different parts of the classification system is inevitable and in some instances desirable, because then such a system represents differences in industrial production processes and marketing arrangements among industries. It is suggested that these differences should be carefully considered

when contemplating a commitment to a single concept.

The Committee's Position

The Committee believes that the current U.S. approach to classifications is problematic, and that an approach or approaches that implement an underlying economic concept or concepts must be considered. However, the overriding objective for a classification is to develop a system that meets user needs. A major part of the disagreement between those who advocate the current approach and those who advocate a conceptual basis arises out of differing assessments of the usefulness of the present SIC system. Many see the present system as useful, though not perfect, in meeting the needs of users, and these individuals see criticisms of it as misunderstandings of the system's objectives. Those who advocate conceptual development emphasize that the present SIC's objectives are not clearly stated and that users have expressed problems with the present system. The Committee's task is to sort out these arguments and to form an assessment on the merits and demerits of the present system and of proposed alternatives.

Request for Comment

The Committee invites comments on the issue of adopting a consistent conceptual framework for the economic classification system. Relevant to the Committee's work are assessments from data users about the usefulness of the present SIC system as well as indications of problems with it. The Committee recognizes that parallel evaluations of conceptually-based systems cannot be rendered at this point, but anticipates public review later in the process of developing any proposed revised classification system. Preliminary responses about the suitability of the supply-side concept, the demand-side concept, or the current approach to classifications are appropriate and are solicited.

1.5 If a Conceptually-based Approach is Chosen, Which Specific Classification Approach or Approaches Should be Adopted?

As discussed previously, a substantial body of economic theory relates to how economic data should be grouped for various purposes. There is thus considerable basis for implementing any of the approaches discussed. Further research, however, would be needed to support actual implementation of either of the two conceptual approaches presented above. The basic question is whether either, or both, of the conceptual approaches should be adopted, or whether the traditional framework—suitably modified—should be retained.

(a) Should there be a supply-side classification system?

A supply-side, or production-oriented, structure would group together commodities

that have similar production processes, or as it is frequently stated in economics, similar production functions. A production-based structure would be essential for international comparisons similar to the examples listed by Jacob Ryten (Williamsburg Conference [18], p. 473): "... to compare across national boundaries the volumes and values of inputs required to produce the same outputs; the degree to which the relative intensity of labour and capital varies from one country to another; the inter-country differences in the scale of operations typical of any particular grouping; and perhaps most importantly, the different returns to capital employed in the same industry but in different countries."

A production-oriented structure is also essential for carrying out productivity studies. Productivity studies compare efficiency relationships between inputs and outputs, and the framework for such studies implies that the units that are grouped together share identical, or similar, production processes. Improving data for productivity analysis was a major priority of the Federal Government's recent Economic Statistics Initiative (see *Survey of Current Business*, February 1990, page 2).

In aggregating establishment data, the concept of joint production is important. Joint production occurs when an establishment's labor force and/or other inputs cannot uniquely be divided among the various products the establishment produces. The case of joint production is different from the situation where establishments do not maintain records on inputs into producing separate products, although it is likely that joint production is often the reason behind the lack of availability of such records.

Frank Gollop (Williamsburg Conference [8], p. 496) states that, in contrast to the demand-side case, statistical agencies must form supply-side aggregates because joint production is prevalent: "If all producers of goods and services were single-product producers, there would be no need for the Census Bureau to provide supply-based aggregates. ... [However], multiple-output producers report the dollar distribution of shipments by detailed product code but do not (and most often, cannot) allocate inputs to the various products or services produced under conditions of joint production. ... If data for multiple-output establishments are to be reported at all, the Bureau ... must aggregate over products within multiple-output establishments ..."

However, Popkin (Williamsburg Conference [17], pp. 187-8) suggests that "... the production-based approach presents considerably more hurdles [than the commodity-oriented approach] on the road to implementation. For example, to group establishments by similarity of production structure, their production structure must first be identified. In other words, to clean the data, the data must first be clean. ... A restaurant, for example, might look more like

a food manufacturing plant than a retail store, when viewed from the production function approach."

Others disagreed with Popkin's assessment, or with parts of it. The first part of Popkin's statement implies that only formal, data-based technical procedures would be used to discriminate among industries, rather than the full range of information about industry production that is in fact used in all countries for classification decisions. Triplett (Williamsburg Conference [22], p. 28) notes that adopting a consistent conceptual approach for economic classification does not mean that SIC classification committees must necessarily carry out complex statistical or econometric analyses. Instead, it "... means only that the classification committee is instructed to follow a consistent principle—and only one principle—in constructing classifications."

Nevertheless, implementing a production-oriented classification concept does imply gathering information about production processes, perhaps beyond the information that is now available (see ECPC Issues Paper No. 3).

(b) Should there be a demand-side classification system?

Studies of the demand for various goods and services, of market share, and so forth require a demand-side classification concept. A demand-based structure would group together commodities that are close substitutes in use, or are functionally related in use. A demand-side system pertains both to households buying commodities for consumption and to firms buying commodities as inputs into their production process.

The need for such a demand-based system was addressed by Popkin (Williamsburg Conference [17], p. 159), who recommended that "... the classification concept be one that classifies items by the markets in which they compete and are sold." He (*ibid.*, pp. 186-7) reasons that "[t]he main advantages of a consumption based approach lie in the analysis of the market structure of an economy. Any demand-based analysis would clearly be facilitated by the aggregation of outputs."

Others do not see the necessity for statistical agencies to produce a demand-side system, because, they maintain, the detailed commodity data are already provided so that demand-side users can aggregate those data for themselves. Data on establishment shipments, sales, revenue, and so forth are available by Census detailed product classifications. For example, the shipments data required to form a sweetener category or a fastener category exist, at least in Economic Census years, and can be combined by any users who need them. Consequently, Michael Gort (Williamsburg Conference [9]) and Frank Gollop (Williamsburg Conference [8]) contend that there is little need for a statistical

agency to expend resources on demand-side aggregations.

Gollop (*ibid.*, p. 497) is also concerned that consensus on the methods for demand-side aggregation will not be reached. He notes: "First, there is no single 'correct' aggregation scheme. ... There are a number of demand-side aggregation techniques—no two of which would necessarily lead to the same set of SIC aggregates. ... The supremacy of each is driven by the particular research question being asked. Second, even if economists were to agree on a particular method, there would likely be significant disagreement over the process of applying the method."

Another view emphasizes the distinction between a commodity classification system, or a commodity-based aggregation system, and an industry classification system. That is, it emphasizes the difference between aggregating detailed product or commodity codes and aggregating establishments.

If users require data on a sweetener aggregation for market-share studies, for example, this need could be met by aggregating over the relevant commodities from SIC's 2046, 2061, 2062, 2063, 2099, and 2869. Such a commodity aggregation system need not imply that inputs from these same industries be combined, for presumably users do not need aggregated information on inputs for demand-side purposes. A commodity system, if needed, could then supplement, not replace, an industry classification system, which would continue to be used to group all data, inputs and outputs, from the establishments included in the grouping.

(c) Is more than one classification system desirable?

Several participants at the Williamsburg Conference pointed out the need for more than one classification system. William Seltzer (Williamsburg Conference [19], p. 487) emphasized that multiple classification systems already exist for some purposes and endorsed extending this idea: "In the language that we seemed to have adopted at this Conference, while 1,000 flowers may be beyond the resources of the Suitland Plantation, certainly the Census Bureau and the SIC can produce more than a single flower." Marilyn Manser (Williamsburg Conference [10], p. 522) recommended that "... users would be well served if one production-based and one demand-based aggregation system were developed." Some other participants expressed similar views.

One reason for endorsing two aggregation systems is to permit maintaining a clear focus on the purposes of a classification system. Paula Young (Williamsburg Conference [28], p. 427) points out that "... data users whose focus is on commodity analysis have targeted the SIC as the vehicle for meeting their needs." She views this as having weakened the SIC's analytical foundation (which is, in her view, for supply-side analyses): "For industry analysis, this foundation must reflect

the production process and the commonality of input structure among establishments, not the end use of the commodity" (ibid.). In support of her production-oriented interpretation of the present SIC, Young quotes from the 1987 SIC Manual ([25], p. 11), which states that the purpose of the SIC is "... for use in the classification of establishments by type of activity in which they are engaged ...". Young calls for the establishment of a second, commodity-oriented, classification system integrated with the SIC.

The Committee has research underway that examines the present 4-digit SIC industries which will identify the number of these industries that already fit into either the supply-side or the demand-side approaches. When this research is completed a report will be made available.

The Committee's Position

The precise concept or concepts to be implemented are not yet clear. The resolution of this issue is perhaps the major undertaking of the ECPC project's research phase.

Request for Comment

The Committee invites comments on any aspect of this issue, including the importance of providing alternative classification systems and on problems that might arise if alternative systems were to be adopted. Proposals for research that would clarify or resolve the economic issues, or provide new or extended methodology that could be applied in developing a system based on either supply-side or demand-side approaches, are also encouraged. Also relevant to this topic are assessments on the advisability of replacing the current approach to classifications with an approach based on economic concepts.

1.6 The Classification Unit

What is the unit of classification? Does it depend on the concept implemented in the classification system?

An establishment is defined as a production entity in a single location. Two establishments may occupy the same or adjacent space if the data available are separable by activity, physical identification, and recordkeeping. The establishment concept has been integral to the U.S. SIC system since its beginning. A key issue in revising the economic classification system is whether the establishment should continue to be the basic unit that is classified.

Concern has been expressed that U.S. business operations have become less establishment-based (Charles Waite, Williamsburg Conference [26], p. 11). Popkin (Williamsburg Conference [17], p. 192) recommends the basic business unit for the new system be changed to "the DDS, the division, department, or subsidiary," a unit determined by the management structure within each firm that reflects its way of doing business. He believes that increasingly firms

do not keep records, or report some types of data, at the establishment level. And Popkin also believes that many of the inputs that have become more important in an advanced economy (business services, for example) are increasingly provided at the enterprise, rather than the establishment level. If so, even a supply-side classification concept must use the DDS as the unit, rather than the traditional establishment.

Ernst Berndt (Williamsburg Conference [3], p. 494) notes that in many industries, especially in recent decades, the extensive activity involving mergers and restructuring of companies and divisions implies that the DDS could involve a great deal of instability over time. Robert McGuckin (Williamsburg Conference [12], pp. 394-5) recommends against moving from the establishment as the basic unit for an industry unless absolutely necessary. Much of the detail on production relationships that one gets from establishments would be lost in consolidation to the DDS level. Also, the establishment represents a fixed location, independent of ownership status: When establishments are the units, the ability to link microdata over time does not depend on the ability to track changes in ownership and management structures, as it will if the DDS is the unit. Marilyn Manser (Williamsburg Conference [11], pp. 524-5) notes that the need for geographic detail is important, and that differing after-tax prices across areas is a reason to refrain from aggregating units across geographic lines.

Some of the examples cited to show the declining relevance of the establishment may simply represent misapplication of the concept (Triplett [22], p. 29). For instance, in banking, ATM's do not correspond to a production unit and should not be considered an establishment. In other examples as well, including pipelines, courier services, and communications, providing a network is the essence of the production process; defining the production unit in one location (the pipeline's pumping station) ignores the most essential aspect of the network.

The question of the classification unit arises in work on classifications outside the United States. Struijs (Williamsburg Conference [21], p. 366) proposes that "The answer to [questions about the classification unit] depends on which parts of the organization act independently, i.e., where autonomy of action resides. ... For example, a franchising chain, say a chain of restaurants, could be seen as an autonomous unit with regard to advertising, while the franchises could all be considered separate [units] where the selling of food is concerned." He goes on to point out that the unit chosen must be one for which records are available, though mere availability does not imply that the recordkeeping center is the appropriate unit. The unit must be a decision-making entity, not just one that holds information.

Some participants at the Williamsburg Conference, while generally agreeing that the establishment should remain the statistical unit, note some qualifications. Stanley Feldman (Williamsburg Conference [7], pp. 269; 294-6) would retain the establishment as the statistical unit, for the most part. He discussed particular issues relating to the application of the establishment concept in banking and insurance. It was also noted that although there are reasons that we should not drop the establishment classification, we may want to supplement it (Waite, Williamsburg Conference [26], p. 11).

A key point for Issues Paper No. 1 is whether the choice of unit is determined by the conceptual basis that is adopted for the classification system. Triplett (Williamsburg Conference [22], p. 28) suggests that for a supply-side, or production-oriented concept, collection of inputs linked with outputs is essential. In this case, the choice of unit is determined by the availability of information on the inputs that are important to production. Whether the DDS or the establishment is the correct unit depends on whether the growth of nontraditional inputs provided by the enterprise has become dominant in modern production. This is an empirical issue, on which there seems no current consensus.

For a commodity-oriented, or demand-side, classification system, on the other hand, the unit is probably not the establishment. A demand-side aggregation system would aggregate commodities or services, no matter where produced, and would by definition not be concerned with inputs. Data could therefore be collected for any level that is convenient, either below the establishment level or at some higher level, such as the DDS.

The Committee's Position

In the Committee's judgment, the choice of unit cannot be considered in isolation from the concept employed. Under a supply-side concept, the establishment might remain the unit. If, however, the establishment is no longer a decision unit, or if business services and other essential inputs cannot be allocated uniquely to establishments, then the establishment is no longer the relevant unit for production analysis, and some other unit is appropriate for classification purposes. For a demand-side system, or other approaches, the choice of the classification unit may be less clear. The ultimate decision on this issue also depends on where business records are kept and on what information is collectible (see Issues Paper No. 3).

Request for Comment

The Committee invites comments on the choice of classification unit, including information on the extent to which inputs are shared across physical locations, whether the establishment remains a meaningful concept, and on instances where the existing establishment concept is inappropriately

applied. The Committee also invites comment on the unit that is appropriate for a classification system that arranges data for market-share analyses or other demand-side purposes.

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