

# Economic Concepts for Economic Classifications

By Jack E. Triplett

*In recent years, increasing concerns have been expressed about the effectiveness of the present U.S. standard industrial classification (SIC) system as the basis for collecting, tabulating, presenting, and analyzing industry data. This article reports on the progress of a committee established by the Office of Management and Budget to examine the purpose, methodology, and structure of economic classifications, with the goal of developing a conceptually based classification system that will support economic analysis and foster international comparability. This article is an updated version of a paper that was presented, under the same title, at the Conference of European Statisticians (U.N. Statistical Commission and Economic Commission for Europe) on June 16, 1993, in Geneva, Switzerland.*

*One issue in the ongoing discussion of economic classification is how to present aggregate industry data in ways that are useful for analysis. The article that follows this one, "An Alternative Framework for Analyzing Industrial Output," illustrates one way of reorganizing detailed SIC industry data into an alternative framework.*

**I**N 1992, the Office of Management and Budget (OMB) established the Economic Classification Policy Committee (ECPC); the ECPC is chaired by the Bureau of Economic Analysis, with representatives from the Bureau of Labor Statistics and the Bureau of the Census. The ECPC has the following charges: (1) Identifying the essential statistical uses of economic classifications, (2) developing economic concepts, new structures, and statistical methodologies, (3) developing classification system(s) based on those concepts, (4) planning the implementation of the new classification system(s), and (5) ensuring that there is ample opportunity for widespread public participation in the entire process. This article summarizes the background for the project and reports on the progress of the ECPC in carrying out these charges.

## Background

The U.S. Standard Industrial Classification (SIC) system was developed in the 1930's and early 1940's. The SIC system has been used by statistical agencies in the United States to ensure compa-

rability in definitions and classifications across industrial surveys. It has been revised periodically, the last time in 1987, with the intention of keeping the system abreast of changes in the economy.<sup>1</sup> The SIC system is well tested in the sense that it has been employed in the production of economic statistics over many years, and it has periodically been reviewed.

Nevertheless, the SIC system has been the object of strong and increasing criticisms. No doubt some of these criticisms contain hyperbole. But it is no exaggeration to say that criticisms of the SIC are widely shared by many users of data produced by the U.S. classification system. Because the criticisms have appeared in public discussion and in the press, attention to economic classifications in the United States has been extended well beyond the usual technical discussions among economic statisticians.

In response to user concerns about the SIC, the U.S. Bureau of the Census sponsored the International Conference on the Classification of Economic Activities in Williamsburg, Virginia, in November 1991 (hereafter, "Williamsburg Conference"). The Williamsburg Conference generated extensive discussions about the economic classification systems that will be needed for the 21st century.<sup>2</sup>

The executive summary of the Williamsburg Conference notes: "Many participants urged a 'clean sheet' approach to developing a new classification system, based on a conceptual framework." This call for a conceptual framework for classification systems represents a relatively new strand in thinking about economic classifications.

Subsequently, the OMB established the ECPC and charged it with conducting a "fresh slate" examination of economic classification systems, with particular emphasis on their conceptual foundations. The ECPC is also emphasizing classifications that will (a) improve services data and

1. U.S. Office of Management and Budget, *Standard Industrial Classification Manual, 1987* (Washington, DC: U.S. Government Printing Office, 1987), National Technical Information Service, PB 87-100012.

2. The *Proceedings* of the conference are available from Carole Ambler, Bureau of the Census, U.S. Department of Commerce, Room 2069-3, Washington, DC 20233.

(b) improve the international comparability of industrial statistics.

The first public output of this project was the publication, in the *Federal Register*, of two "issues papers," which requested public comment on a series of conceptual questions concerning economic classifications.<sup>3</sup>

### *North American classification system*

Subsequent to the publication of the ECPC issues papers on economic concepts, the committee initiated discussions with Statistics Canada and with Mexico's Instituto Nacional de Estadística, Geografía e Informática (INEGI). The three countries have agreed to put in place a North American economic classification system based on an economic concept, as proposed in ECPC Issues Paper No. 1. The new system will meet the demand for common industrial data covering the economies of the three signatory countries to the North American Free Trade Agreement. Though implementing a common international classification system will no doubt entail more changes to industry classifications in each of the three countries than otherwise would have taken place, having internationally comparable data constructed to fit economic concepts promises substantial gains in the usefulness of the data for economic analysis.

The remainder of this article summarizes the principal conceptual issues the ECPC, Canada, and Mexico are addressing and the initial responses of users who have reviewed the first two ECPC issues papers.

### *Conceptual issues*

A major task for the new North American classification system is the development of an underlying economic concept for economic classifications. When applied to industrial statistics, this search for an economic concept implies the return to an old question, "What do we mean by the term 'industry'?" In ECPC Issues Paper No. 1, this question has been replaced by a more fundamental question: "For what uses are industrial statistics wanted?" When one has specified a use for economic statistics, one can then derive an underlying classification concept from the use of

the data. If the classification concept is implemented consistently throughout the system, the statistics will be appropriate for the intended use. The ECPC's approach to the question of industry definition marks perhaps its greatest departure from past work on classifications.

Obviously, there are multiple uses for industrial statistics. The ECPC's analysis suggests that this multiplicity of uses can be divided into two broad categories, which implies two alternative economic concepts for classifications.<sup>4</sup>

*For uses that imply a production-oriented concept*, grouping by similarity of production process will provide the appropriate industrial statistics. Examples of such data uses include the measurement and analysis of productivity at the industry or sector level, comparisons of the capital intensity of production across different economies, and marketing analysis for products or services that are inputs to particular production processes. In ECPC Issues Paper No. 1, the economic concept that is appropriate for such uses of industrial statistics is designated a "production-oriented," or "supply-based" concept.<sup>5</sup>

*For uses that imply a demand-based concept*, grouping according to characteristics of the demand for commodities will provide the appropriate statistics. Examples of such data uses include calculating market share for studies of monopoly power, marketing analyses that are concerned with competitive shares, and demand studies concerned with either demand for consumption goods or demand for inputs to other production or distribution processes. For these uses, one groups commodities by similarities in the way commodities are used—close substitutes, for example, or alternatively, commodities that are used together. This concept for economic classifications is designated in ECPC Issues Paper No. 1 as a "use of the commodity," or "market-oriented," or "demand-based," concept.

It is not difficult to find examples where these two economic concepts conflict in application. The ECPC issues papers discuss the case of sugar products, which in the SIC are placed in three separate industries on the basis of production differences: One industry distinguishes sugar prod-

3. ECPC Issues Paper No. 1, "Conceptual Issues," and Issues Paper No. 2, "Aggregation Structures and Hierarchies." Other issues papers have been released subsequently: Issues Paper No. 3, "Collectibility of Data," Issues Paper No. 4, "Criteria for Determining Industries," and Issues Paper No. 5, "The Impact of Classification Revisions on Time Series." Issues papers are available from Brenda M. Erickson, Economic Classification Policy Committee (BE-42), Bureau of Economic Analysis, U.S. Department of Commerce, Washington, DC 20230, (202) 606-9620 or FAX (202) 606-5311.

4. The two concepts are summarized in "Conceptual Issues," section 1.2. They receive a somewhat more technical treatment in Jack E. Triplett, "The Theory of Industrial and Occupational Classifications and Related Phenomena," in *1990 Annual Research Conference, Proceedings in Arlington, Virginia, March 18-21, 1990*, by the Bureau of the Census (Washington, DC: U.S. Government Printing Office, 1990): 9-25.

5. In international materials on classifications, this production-oriented economic concept is similar to the definition of the term "activity." Statistical Office of the United Nations, *International Standard Industrial Classification of all Economic Activities*, Statistical Papers, Series M, No. 4, Rev. 3, (New York: United Nations Publications, 1990): 9, par. 29.

ucts made from sugar cane; another distinguishes sugar products made from sugar beets; a third distinguishes sugar products made from purchased raw cane sugar (that is, sugar-producing establishments that are not integrated back to the cane stage). Establishing separate sugar industries on the basis of production differences might be appropriate for the analysis of production, productivity, and so forth, and the classification would be consistent with a production-oriented concept.

The U.S. groupings of sugar products, however, certainly do not correspond to a market- or demand-based grouping: For most uses of sugar products, a cane sugar product and a corresponding beet sugar product are almost perfect substitutes. Present U.S. sugar industry groupings seem inappropriate for studying competitive market share or for demand analysis. Indeed, for many market-oriented purposes, the appropriate category is not sugar products at all, but rather “sweeteners.” One would group sugar products with corn sweeteners (now placed in an industry defined in the SIC on the basis of production process), with honey, and with artificial sweeteners (located in the SIC in an inorganic chemicals industry).

In contrast to sugar products, some other U.S. industries group together producing units that have very different production processes. Examples noted in the ECPC issues papers include “Hand and Edge Tools” (which appears to be grouped partly according to commonality in distribution systems) and “Musical Instruments.” Another example is “Farm Machinery and Equipment,” which groups together such dissimilar products as chicken brooders, hair clippers, and farm tractors, products that are produced by very different processes and that are linked together only by the class of user. From groupings containing such heterogeneous production processes, it is not clear that one could learn anything useful about production relationships, about differences in capital intensity across different economies, or about marketing of inputs.

The same distinction between production-oriented and demand-based concepts appears in comparisons of international classification systems. For example, the United States distinguishes fishing by production methods—fish produced on fish farms is placed in a different SIC industry from fish caught in the open sea. Canada, on the other hand, uses a demand-based, marketing concept: Fish caught in the ocean and fish produced on fish farms are very close substi-

tutes from the view of the consumer, and they are distributed in similar ways, so they are grouped together.

The production-oriented and demand-based distinction can be seen again in work that is underway to form a concordance among the Canadian SIC system, the U.S. SIC system, and the General Industrial Classification of Economic Activities within the European Communities (often referred to as “NACE”), which is the classification system used in Europe. In some cases, one or more of the three systems have adopted a production-oriented concept, while another has adopted a demand-based concept. For example, in the U.S. classification system, the production of “wood chips” is placed in two different industries because wood chips are produced by different processes, but in the European classification system, all wood chips are grouped together because the chips serve the same purposes. Other similar, and enlightening, examples have come out of the concordance project.

Thus, whether comparing industrial classifications within one country’s system or comparing classification systems across different countries, one encounters the same phenomenon. Some classification decisions have been based on production-oriented reasoning, while others have been made on market- or demand-based reasoning. In some cases, decisions involving demand-based reasoning have been superimposed on a basic structure erected on production-oriented reasoning.

The observation that both demand-based and production-oriented considerations exist in the definition of industry is not itself new. Nearly 30 years ago, James McKie noted that: “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” (emphasis supplied).<sup>6</sup>

Despite this recognition, the objective pursued in designing nearly all classification systems, including that of the United States, has been to try to find the “perfect industry” in which the production-oriented concept and the demand-based concept coincide. Implicit in this attempt is the notion that the cases in which the two concepts do not coincide, and therefore do not

6. James W. McKie, *Industry Classification and Sector Measures of Industrial Production*, Bureau of the Census Working Paper No. 20 (Washington, DC: U.S. Bureau of the Census, April 1965).

yield the same classification, are exceptions to the general rule and that such exceptions can be handled on a case-by-case basis. Further, in handling the exceptions, the belief has been that some compromise between the two concepts could produce statistical measures that would accommodate both of the two broad categories of users.

The ECPC's investigation suggests that the perfect industry is by no means the norm in a modern industrial economy. In many instances—too many to be thought of as mere exceptions—production-oriented and demand-based concepts yield quite different classifications. The United States and Canada have studies underway that examine existing four-digit SIC industries in the respective countries to determine the extent to which they reflect primarily demand-based or production-oriented economic concepts. The studies will be available soon.

### *Decisions*

The new classification system requires resolution of the following three questions.

(1) *Is a consistent concept for economic classification desirable?*—The case in favor of a consistent economic concept is set out in ECPC Issues Paper No. 1 (section 1.4):

- Without a consistent economic concept for grouping and classifying data, users will find that the data are not always grouped appropriately for a given purpose. Users may be unaware of inconsistencies that arise in the system. Where users do see inconsistencies, they may criticize the system and complain, as they frequently have, that data grouped by the system are not analytically useful.
- A consistent economic concept provides an overall philosophy that can be incorporated into the description of the system and can guide decision making during the process of constructing the system. Without a consistent economic concept, whoever constructs a classification system must inevitably choose from among competing requirements.
- In presenting the classification system to the public, an economic concept facilitates explaining why data are grouped in one way rather than another. Without a consistent concept, the system as a whole cannot be understood by users; misunderstanding leads to inadvertent misuse of the data and to controversies and criticisms of the system. The

system needs a consistent concept to provide a coherent framework for critiquing the system in order to improve it.

The counterargument, the position opposing the use of a consistent economic concept in a classification system, is also expressed in ECPC Issues Paper No. 1 (section 1.4):

- A consistent economic concept may not be feasible in a classification system because industries themselves are organized in differing ways. Some industries are organized on the basis of production relations, but others are organized on the basis of marketing patterns or uses. The present system reflects those differences.
- Those who criticize the SIC system because it contains inconsistencies of concept do not understand that these apparent inconsistencies exist because of variations that exist in the economy. Inconsistency is a valid criticism of the classification system only if consistency is the main objective of the system.
- In some cases, it seems doubtful that data can in fact be collected on one or the other of the conceptual bases. On this view, then, a conceptually based system is not practical.

(2) *Are multiple classification systems feasible or desirable?*—Review of the uses of industrial data suggests that at least two different conceptual bases are wanted in classification systems. If the ECPC were to propose a classification system based on an economic concept, two, or possibly more, classification systems might be needed. Multiple classification systems might increase costs, create confidentiality problems, and lead to potential confusion among users.

(3) *Is the implementation of a consistent economic concept in a classification system feasible?*—The proposal for implementing a consistent conceptual basis for economic classifications needs to be tested, and this has yet to occur. The ECPC has noted a number of recent research studies that have developed new techniques, based on economic theory, to identify production-oriented groupings. Though these techniques hold promise, they may not be fully operational in time to make a real contribution to imminent classification decisions.

### *Reactions from users*

In addition to their publication in the *Federal Register*, ECPC issues papers have been presented

to industry groups and to advisory committees to the U.S. Bureau of the Census and the U.S. Bureau of Labor Statistics (BLS). They have also been reviewed by Canadian users of industrial statistics.

The Census Bureau advisory committees represented the American Economic Association, the American Marketing Association, and the American Statistical Association. Comments received from all three organizations were highly favorable. Representatives stated that the issues the ECPC was exploring were important and were ones that had not been fully explored before. The representative from the American Marketing Association indicated that the concepts in the ECPC issues papers, though drawn from economics, are useful in marketing, which also requires analyses that distinguish production-oriented and demand-based perspectives.

Representatives of the Business Research Advisory Committee to BLS indicated that some parts of the present SIC are quite satisfactory for their purposes, but others are not. They were not certain that the ECPC's distinctions between production-oriented and demand-based concepts were relevant for the mostly pragmatic concerns that they expressed.

The comments that the ECPC received on ECPC Issues Papers Nos. 1 and 2 display a wide range of views. Public responses indicate substantial support for examining economic concepts for classifications, though also some reservations. Of the respondents who favor a

conceptual framework for economic classifications, some favor a supply-based system and some a demand-based system. Respondents also have substantial concerns about costs and feasibility, as well as about potential disruptions that any new system would produce in time series. Though views on international compatibility were not sought in the *Federal Register* notice, respondents often volunteered that international compatibility, particularly among North American countries, is important in their uses of industrial statistics. (The report "Summary of Public Comments to ECPC Issues Papers Nos. 1 and 2" is available from ECPC on request.)

### *Reactions from overseas*

The ECPC has also discussed its research and deliberations on classifications with the international statistical community. For example, the paper that provided the basis for this article was read at the Conference of European Statisticians in June 1993, and consultations with several European statistical agencies have been undertaken. This process will continue over the next several years. The North American countries have welcomed comments from the international statistical community on their approach, on the issues presented in ECPC issues papers, and on the research studies that have become available. The research for the forthcoming North American system will be available for future revisions of the systems used in other countries. 