Letters

Academic Economics

"A dismal performance. . . . What economists revealed most clearly was the extent to which their profession lags intellectually" (*1*). This editorial comment by the leading economic weekly (on the 1981 annual proceedings of the American Economic Association) says, essentially, that the "king is naked." But no one taking part in the elaborate and solemn procession of contemporary U.S. academic economics seems to know it, and those who do don't dare speak up.

Two hundred years ago the founders of modern economic science—Adam Smith, Ricardo, Malthus, and John Stuart Mill—erected an imposing conceptual edifice based on the notion of the national economy as a self-regulating system of a great many different but interrelated, and therefore, interdependent, activities; a concept so powerful and fruitful that it gave impetus to Charles Darwin's pathbreaking work on his theory of evolution.

The central idea of what is now being referred to as Classical Economics attracted the attention of two mathematically trained engineers. Léon Walras and Vilfredo Pareto, who translated it with considerable refinement and elaboration into a concise language of algebra and calculus and called it the General Equilibrium Theory. Under the name of neoclassical economics this theory now constitutes the core of undergraduate and graduate instruction in this country.

As an empirical science, economics dealt from the outset with phenomena of common experience. Producing and consuming goods, buying and selling, and receiving income and spending it are activities engaging everyone's attention practically all the time. Even the application of the scientific principle of quantification did not have to be initiated by the analyst himself—measuring and pricing constitute an integral part of the phenomena that he sets out to explain. Herein lies, however, the initial source of the trouble in which academic economics finds itself today.

By the time the facts of everyday experience were used up, economists were able to turn for bits and pieces of less accessible, more specialized information to government statistics. However, these statistics—compiled for administrative or business, but not scientific, purposes—fall short of what would have been required for concrete, more detailed understanding of the structure and the functioning of a modern economic system.

Not having been subjected from the outset to the harsh discipline of systematic fact-finding, traditionally imposed on and accepted by their colleagues in the natural and historical sciences, economists developed a nearly irresistible predilection for deductive reasoning. As a matter of fact, many entered the field after specializing in pure or applied mathematics. Page after page of professional economic journals are filled with mathematical formulas leading the reader from sets of more or less plausible but entirely arbitrary assumptions to precisely stated but irrelevant theoretical conclusions.

Nothing reveals the aversion of the great majority of the present-day academic economists for systematic empirical inquiry more than the methodological devices that they employ to avoid or cut short the use of concrete factual information. Instead of constructing theoretical models capable of preserving the identity of hundreds, even thousands, of variables needed for the concrete description and analysis of a modern economy, they first of all resort to "aggregation." The primary information, however detailed, is packaged in a relatively small number of bundles labeled "Capital," "Labor," "Raw Materials," "Intermediate Goods," "General Price Level," and so on. These bundles are then usually fitted into a "model," that is, a small system of equations describing the entire economy in terms of a small number of corresponding "aggregative" variables. The fitting, as a rule, is accomplished by means of "least squares" or another similar curve-fitting procedure.

A typical example of a theoretical "production function" intended to describe the relationship between, say, the amount of steel produced, y_1, and the quantities of the four different inputs, y_2, y_3, y_4, and y_5 needed to produce it is, for instance, described as follows (*2*):

$$y_1^{\rho 1} = a_1|G^2|^{\rho 1} + (1 - a_1)\,|G^3|^{\rho 1}$$

where:

$$-G^2 = [a_2|y_2|^{\rho 2} + (1 - a_2)\,|y_3|^{\rho 2}]^{1/\rho 2}$$
$$-G^3 = [a_3|y_4|^{\rho 3} + (1 - a_3)\,|y_5|^{\rho 3}]^{1/\rho 3}$$

or, alternatively:

$$\ln |G^2| = \tfrac{1}{2}\ln |y_2| + \tfrac{1}{2}\ln |y_3|$$
$$\ln |G^3| = \tfrac{1}{2}\ln |y_4| + \tfrac{1}{2}\ln |y_5|$$

or, finally:

$$\ln y_1 = a_1 \ln |G^2| + (1 - a_1) \ln |G^3|$$

To ask a manager of a steel plant or a metallurgical expert for information on the magnitude of the six parameters appearing in these six equations would make no sense. Hence, while the labels attached to symbolic variables and parameters of the theoretical equations tend to suggest that they could be identified with those directly observable in the real world, any attempt to do so is bound to fail: the problem of "identification" of aggregative equations after they have been reduced—that is, transformed, as they often are—for purposes of the curve-fitting process, was raised many years ago but still has not found a satisfactory solution. In the meantime, the

Table 1. Percentages of different types of articles published in the *American Economic Review*.

Type of article	March 1972 to December 1976	March 1977 to December 1981
Mathematical models without any data	50.1	54.0
Analysis without mathematical formulation and data	21.2	11.6
Statistical methodology	0.6	0.5
Empirical analysis based on data generated by the author's initiative	0.8	1.4
Empirical analysis using indirect statistical inference based on data published or generated elsewhere	21.4	22.7
Empirical analysis not using indirect statistical inference based on data generated by author	0.0	0.5
Empirical analysis not using indirect statistical inference based on data generated or published elsewhere	5.4	7.4
Empirical analysis based on artificial simulations and experiments	0.5	1.9

procedure described above was standardized to such an extent that, to carry out a respectable econometric study, one simply had to construct a plausible and easily computable theoretical model and then secure—mostly from secondary or tertiary sources—a set of time series or cross section data related in some direct or indirect way to its particular subject, insert these figures with a program of an appropriate statistical routine taken from the shelf into the computer, and finally publish the computer printouts with a more or less plausible interpretation of the numbers.

While the quality and coverage of official statistics have recently been permitted to deteriorate without eliciting determined protest on the part of their potential scientific users, masses of concrete, detailed information contained in technical journals, reports of engineering firms, and private marketing organizations are neglected.

A perusal of the contents of the *American Economic Review*, the flagship of academic economic periodicals over the last 10 years, yields the picture in Table 1.

These figures speak for themselves. In a prophetic statement of editorial policy, the managing editor of the *American Economic Review* observed (*3*) 10 years ago that "articles on mathematical economics and the finer points of economic theory occupy a more and more prominent place than ever before, while articles of a more empirical, policy-oriented or problem-solving character seem to appear less frequently."

Year after year economic theorists continue to produce scores of mathematical models and to explore in great detail their formal properties; and the econometricians fit algebraic functions of all possible shapes to essentially the same sets of data without being able to advance, in any perceptible way, a systematic understanding of the structure and the operations of a real economic system.

How long will researchers working in adjoining fields, such as demography, sociology, and political science on the one hand and ecology, biology, health sciences, engineering, and other applied physical sciences on the other, abstain from expressing serious concern about the state of stable, stationary equilibrium and the splendid isolation in which academic economics now finds itself? That state is likely to be maintained as long as tenured members of leading economics departments continue to exercise tight control over the training, promotion, and research activities of their younger faculty members and, by means of peer review, of the senior members as well. The methods used to maintain intellectual discipline in this country's most influential economics departments (*4*) can occasionally remind one of those employed by the Marines to maintain discipline on Parris Island.

WASSILY LEONTIEF
Institute for Economic Analysis,
New York University,
New York 10003

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2. L. R. Christensen, D. W. Jorgenson, L. J. Lau, "Transcendential logarithmic production functions," *Rev. Econ. Stat.* **55**, 28 (1972).
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"Myeloma"

When one considers the importance of the revolution brought about by hybridoma research (News and Comment, 26 Feb., p. 1073), it is unfortunate that the term "myeloma" has been applied to the neoplastic plasma cells that are an integral part of the technology.

The term was probably first used because of a supposed resemblance of the plasma cells to multiple myeloma cells in humans, but the mouse has no similar disease. The neoplastic plasma cells in the mouse do not involve the bone marrow unless they are introduced into the bloodstream.

The suffix "oma" is understood by pathologists to refer to a swelling or mass and can be applied to nonneoplastic masses, as in "tuberculoma" or "granuloma." Obviously there is no swelling in cells in tissue culture and no specific cell of the bone marrow for which the suffix "oma" could be used. The plasma cell in tissue culture continues to be a plasma cell, and it should not be disguised under the term "myeloma."

The term "hybridoma" is also unfortunate, but by now it is so well established that change is probably impossible. Fused cells in tissue culture do not constitute a tumor, or "oma," and to consider them as hybrids can also be questioned.

These complaints may seem trivial and peevish, but serious errors in thinking can result from the imprecise use of terms.

THELMA B. DUNN
501 V.E.S. Road,
Lynchburg, Virginia 24503

Federal Information Services

In his editorial "Essential federal information services" (28 May, p. 937), Philip H. Abelson gives good reasons for concern over budget threats to the National Library of Medicine and over the possible disposal of the National Technical Information Service (NTIS), or major elements of it, to private enterprise. A history of innovative information processing and dissemination by the National Library of Medicine could be brought to an end, or greatly reduced; and the present availability of government technical reports and other NTIS services could be severely affected by entrepreneurial skimming of the most salable products.

Abelson's concern is valid, but a basic objection to these latest threats of curtailment of government information services can be stated even more fundamentally. Such threats do violence to a principle officially acknowledged (*1*) some 20 years ago: the information dissemination process is an integral part of the research cycle which creates new knowledge. The services of the National Library of Medicine and NTIS—whether for bibliographic or text access, whether in electronic, microform, or print format—actually constitute only the final sequence in this research cycle which the taxpayer funds at great cost and which is justifiable only if the results reach those who can make use of them. If they do not, the new knowledge and information cannot serve its intended purpose as the driving energy for countless activities contributing to our national well-being (including medical care and the all-important gross national product).

The cost of information dissemination is relatively miniscule when compared to the billions of dollars invested in the research itself, either in the government's own laboratories directly or in its grants or contracts to universities or private investigators. Rather than responding affirmatively to pressures threatening the return on the taxpayers' investment, Congress should strengthen and ensure the continuing growth of vital information services.

IRMA Y. JOHNSON
Science Library,
Massachusetts Institute of Technology,
Cambridge 02139

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