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ECONOMIC VALUE OF STATISTICAL INFORMATION
TASK FORCE INTERIM REPORT*

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The title of this symposia is Task Force Reports: Preliminary Findings. However, for purposes of our report, the last part of the title should be changed to "preliminary questions." We have few if any findings or answers. However, I think we have identified some challenging questions for the economic research community to address.

The charge given the task force is "to establish the conceptual and operational foundation for improved estimates of the value of statistical information." This is a formidable task indeed. We, as a task force, do not purport to have the necessary talent and resources to accomplish this charge ourselves. We anticipate the development of a symposium sometime during 1979 that will enlist the help of other researchers to focus on the charge given the task force and to address some of the key questions identified by the task force.

As a background to what we will be proposing for the symposium program, I would like to share with you some of our thoughts and observations as we have examined our charge.

Our primary conclusion -- in fact our only conclusion at this point -- is that an adequate theoretical or methodological framework for valuing information does not currently exist. The following two paragraphs from a recent unpublished USDA staff paper by Tom Miller does a good job of summarizing the current situation.

"A number of factors contribute to this methodological problem. One is the general absence of a market system for information. Thus, there is no 'market price' for many public information systems that would suggest their value. Secondly, information is not a physical good and, therefore, lacks the concreteness that provides a basis for valuing many items such as, for example, a reclamation project. Thirdly, many information systems do not have an impact that is observable in secondary data. Therefore, many econometric techniques are of little assistance in estimating information values. Fourthly, the concept of information value itself is somewhat an abstraction. Many types of information possess the characteristics of a public good, and the private value may be substantially different from the social value. As a result, information value concepts tend to involve a degree of subjectivity."

"Since the methods are more procedural than they are substantive, controversy exists concerning the proper or best methodology, and there is always much left to debate after a study is completed. Within this climate, several methodological approaches have been suggested for valuing information systems. However, no specific method has proven itself in general applications. Indeed, economists are somewhat divided concerning a proper methodology. Such background suggests that research concerning the value of information should emphasize development of an underlying theory and methodology."

In one of the invited paper sessions yesterday in Developments in the theory of the Economics of Information, Professor Eisgruber made essentially the same observations in the introductory part of his paper. In fact, for a moment, I thought that he had mistakenly picked up a copy of this report and was using it as a basis for his discussion.

During that session yesterday, the question was raised as to why the rather substantial theoretical contributions of Arrow, Stigler, Marschak, and others had not been included in Professor Eisgruber's review of past work. One might argue that the works of these authors provide a considerable theoretical basis for the economics of information. However, the theoretical developments to date do not include an analytical framework that enables us to translate the theory into meaningful empirical analysis. It is one thing to recognize that information is an economic good and should be used in amounts that equate marginal benefits with marginal costs. It is something quite different to empirically measure the marginal benefits and costs of a particular type of information. It is these analytical frameworks that are particularly lacking. However, the theoretical foundations on which to develop the analytical frameworks are far from complete.

As we move toward the development of this theory and methodology, there are several questions that will have to be addressed. For example:

1. What is information? How is it to be measured?
2. What constitutes an improvement or an increase in information?
3. What are the characteristics and/or dimensions that cause information to have value? Is it accuracy, timeliness, quality, or some other dimension? Do these dimensions always have the same relative value?
4. What are the implications of the fact that many types of information have characteristics of a public good?

One use (and hence one source of value) for information is as an input into decision processes. The value of information is dependent on how the use of the information

alters the outcome of the decision process from what would have occurred in the absence of using the information. Since the set of decision alternatives and possible sets of outcomes are dependent on the economic environment of the decision maker, the value of a given unit of information is likely to be different in one situation than another. For example, the value of knowing that there will be a 10 percent reduction in this year's corn crop (relative to last year) will be different if current stocks are equal to two year's normal production than if current stocks are only 15 percent of one year's normal production. Moreover, it seems likely that marginal improvements in the accuracy of crop production estimates would not be the same in these two situations. These observations suggest that any calculation of the value of this type of information will by necessity be conditional upon the set of assumptions one makes about the nature of the economic environment at the time the information is generated and/or used. Consequently, one might seriously question conclusions from theoretical and empirical models to the effect that the value of a given unit of information is a fixed dollar amount or that an X percent improvement in the accuracy of a given forecasting system has Y dollars of value.

Miller points out that there are two groups of information users: market users consisting of producers, consumers, and marketing firms; and non-market users consisting of government policy makers, government program administrators and researchers.

If we are to place a value on information used in the market place, we have yet another theoretical and methodological void to fill. Information undoubtedly plays an important role in the process of price determination, product price variation over time, space and form, and, consequently, the efficiency of markets. But just what is the role of information in each of these areas? How would a 10 percent increase or decrease in information impact each of these areas and what would be

the value (cost) of this change in information? Our current theory is largely based on the assumption of perfect information. We consequently have assumed away the problem of measuring information and its value. Once we recognize that perfect information does not exist, one is hard pressed to arrive at measures by which to evaluate the performance and efficiency of markets. We have many unanswered questions about the role and, consequently, the value of information in the market place. For example:

1. How much and what type of information is required for a market to perform effectively its price discovery functions? There is widespread concern that the decentralization of markets has led to an inadequate amount of information in many markets. However, these markets generally continue to clear in an orderly fashion and schemes to provide more "information" often fail the market test.
2. How much market price volatility is acceptable or desirable? How much and what type of information is required to achieve the desired level of price stability?

The value of statistical information to non-market users generally seems to have received less attention in the literature than market uses of information. A viable measure of the value of information cannot ignore this dimension of value.

Changes in government programs and policies can create new and added value for information. Moreover, the existence of these programs can perhaps place a premium on accuracy of information that exceeds the accuracy premium generated by market users. For example, consider the current price support program of deficiency payments equal to the difference between the target price and the

annual average price received by farmers. A one cent per bushel error in measuring the market average price of a 6.0 billion bushel corn crop translates into a \$60 million difference to farmers and the U.S. treasury if payments are triggered. Similarly, Harris has recently shown the implications for accuracy in measuring cost of production information used in setting target prices and loan rates.

One of the more important questions about the value of statistical information systems deals with the decisions of administrators of public information systems.

Program administrators are continuously caught between the demands by users for more and better information and the pressures of cost that increase more rapidly than budgets. In the absence of a global measure of the value of information, what is the decision framework that should be used to make decisions about changes in public information systems?

"What kind of information about the value of information is needed to make decisions about changes in these systems that are in the public interest?"

The pragmatic approach to making decisions about specific components (programs) of the public information systems has led to efforts aimed at program evaluation rather than program valuation -- i.e. efforts to identify who is using the information and how they are using it as well as examination of the information gathering and dissemination process itself. Efforts by the economic research community to improve the theory and methodology of evaluation of public information systems may well have a more rapid payoff than efforts to develop the theory and methodology for global valuation of information systems. Moreover, the need for effective program evaluation procedures will continue even after the

development of the global valuation procedures. There is likely to be room for improvement in even the most valuable of information systems.

The distributional aspects of public information systems should not be overlooked in our attempts to develop either valuation or evaluation procedures. There appears to be a widespread feeling among producers that information about their current and anticipated production levels results in a transfer of wealth from producers to processing firms and consumers. In some instances, producers suggest that the way to beat the system is to lie about their actual and planned production. Under what conditions, if any, does the release of production estimates and producer's intentions work to the detriment of producers either as a group or individually? Is it in the producer's interest to lie about current and planned production levels? If so, is it in their interest to inflate or deflate actual production numbers? Answers to these questions may not have to await the development of a global theory and methodology of information valuation. Answers to these questions and associated information programs would be an important contribution of the economic research community to achieving a "second best" solution with respect to public information systems in the absence of a valuation procedure that enables decision makers to achieve the optimal allocation of information gathering and disseminating resources.

As I indicated at the beginning of this report, we have raised many questions and have few answers. We see the development of procedures for the improvement of both valuation and evaluation of information systems as being a productive use of research resources in the future. As an initial step in focusing the attention of the profession on the questions and problems in this area, we are proposing that a symposium be held sometime next year. The purpose of the symposium would be to stimulate research activity on this topic through a combination of prepared papers

addressing key issues in this area and group discussion of questions and problems facing both researchers and administrators.

The exact topics and presenters for the symposium have not been selected. However, we are currently thinking about structuring the program around the following outline.

POSSIBLE FORMAT FOR
VALUE OF INFORMATION SYMPOSIUM

A. Problem statement

1. Needs by decision makers for value of information measures
 - a. Quantity and type of information
 - b. Level of accuracy
 - c. What kind of information on information value is needed for effective decisions to change the information system?
 - d. With inability to control or predict major variables (e.g., weather), is value of more accurate historical data minimal?
2. Rationale for public information systems
3. State of the art in information value research

B. Theoretical perspective

1. What constitutes value: private and public?
 - a. Social welfare
 - b. Wealth transfer
 - c. Promoting competitiveness
 - d. What is improved information?
2. Problems in measurement
 - a. Motivation for dishonest reporting
 - b. Quantification problems
3. Relations between information and market efficiency
4. Should we worry about information value?

C. What is being done?

1. Identification of users and needs
2. Measuring value
3. Aggregate vs. micro evaluations
4. What findings from studies on research value can help to improve decisions on information systems?

D. Where do we go from here?

1. Major problems to be addressed
2. Theoretical needs — model structure, hypotheses, consolidation, expansion
3. Empirical research needed
4. Education of public about information value
5. How can the academic-research community be of assistance in developing and changing information systems?

We would welcome any suggestions you have about topics and format for the symposium. We would particularly appreciate your assistance in identifying individuals, including yourself, whom you think could make a contribution by developing a paper on one of the symposium topics.

JBB/cf

* Task force members are (Thomas Miller, ESCS, Ft. Collins; Richard Shumway, Texas A & M; James Olson, ESCS, Washington D.C.; Willis Peterson, University of Minnesota; and Bruce Bullock, Farmbank Services.

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