BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

Government Measures Of Private-Sector Productivity: Users Recommend Changes

Measures of private sector productivity compiled by the Bureau of Labor Statistics can be improved. This is according to users surveyed by GAO from unions, private businesses, and Federal Government agencies. Those users consistently supported three improvements:

--Develop a new industry productivity measures program.

--Provide more explanation about published measures.

--Produce measures which include inputs from capital as well as labor.

Such measures would provide information necessary to improve national productivity.

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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To the President of the Senate and the
Speaker of the House of Representatives

This report discusses improvements needed in the productivity statistics published by the Department of Labor's Bureau of Labor Statistics. It also discusses the Department of Commerce role in productivity measurement. The information in this report relates closely to a recent report by the National Academy of Sciences' Panel to Review Productivity Statistics entitled "Measurement and Interpretation of Productivity." However, the National Academy report is a technical work by academic and other economists; our report focuses on the views of business, labor, and Government users of productivity measures.

We are recommending that the Department of Labor take action to improve its productivity measures and that the Department of Commerce consider an outreach program to promote productivity measurement by firms.

We are sending copies of this report to the Secretaries of Labor and Commerce.

Milton J. Socolar

Acting Comptroller General
of the United States

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

GOVERNMENT MEASURES OF PRIVATE-SECTOR PRODUCTIVITY: USERS RECOMMEND CHANGES

D I G E S T

The Bureau of Labor Statistics (BLS) publishes a wide range of measures of the private sector's productivity. These measures are used primarily for economic analysis and forecasting directed toward improving the economy. GAO studied the measures to determine, from a user's viewpoint, how they might be improved.

The National Academy of Sciences has also examined the Government's productivity measures. The Academy convened 14 economists and other experts to study possible technical and conceptual improvements to the measures, whereas GAO concentrated on the general needs of users.

To determine the cost-effectiveness of improvements to productivity measures is nearly impossible. Better measures would provide information to improve National Productivity. However, since certain measures are widely reported in the news media, the ultimate scope of their use is unknown. Further, the measures generally are used in conjunction with other economic information--they are but one item in a "market-basket" of indicators. Therefore, their net contribution to economic analyses and decisions is uncertain and the cost-effectiveness of any single improvement to the measures is difficult to determine.

However, GAO found that users drawn from unions, the private business sector, and Federal Government agencies consistently supported three improvements:

--Developing a firm-level industry productivity measures program.

--Providing more explanation about currently published measures.

--Producing measures which include input from both capital and labor.

Improvement in national productivity is needed to aid the fight against inflation, but improvement must start at the lowest level of the economy--that of the firm. Any effort to improve productivity at the firm level is enhanced by the use of productivity measures. Further, if productivity measures were available for relatively homogeneous groups of firms, these firms would have a tool for comparing their own performance with competitors' and for identifying areas needing improvement. Such measures, however, are generally unavailable. Many firms do not measure their productivity, and may not know how to measure it. One way the Federal Government could help improve national productivity would be to encourage firms to measure their own productivity and compare themselves to firms in similar industries.

The current Bureau of Labor Statistics industry measures are based on industry aggregates which are too general to be used by firms in improving productivity. For example, the Bureau of Labor Statistics produces a total coal industry measure. However, coal industry associations showed GAO that the various sectors of the industry differ significantly. The output per day/per person of surface mines west of the Mississippi River is twice that of mines east of the Mississippi. Thus, comparisons of productivity or other operating performance information between the firm and the industry are meaningless.

Although a program to develop firm and interfirm measures could require the Bureau to work directly with a large number of firms, the Bureau is not structured for such an undertaking--its role is data collection and analysis. The Department of Commerce, however, has initiated some firm-level productivity improvement programs in the past few years, which could be the foundation for a significant new national productivity improvement program based on interfirm comparisons.

The recommendation that productivity measures be more fully explained was intended for a variety of specific situations. Many users pointed to misunderstandings of the measures, leading to erroneous conclusions by the news media. Others felt that more background should be offered to explain the makeup of the measures and any changes to them. They believed that better economic analyses could be developed if better background information were provided.

Users recommended that capital as well as labor be used as input to productivity measures to better reflect true productivity changes in the economy. Productivity measures which compare the total economy's output to all associated input are not produced by the Bureau. Only labor measures are published because labor input is the only statistic now considered accurate enough for productivity analysis.

Labor productivity is not an incomplete productivity measure; rather, it is one of the family of measures that includes those based on just capital and on labor plus capital (sometimes called multifactor productivity). Historically, labor productivity has been used in economic analyses and forecasts as a substitute for multifactor productivity. However, the use of a substitute is not always exact enough for important economic analyses. This is especially true during periods of unusual changes in the growth of capital and the economy. Unusual changes in capital growth are apparently occuring now because the energy crisis is causing producers to shift to more energy-efficient equipment.

RECOMMENDATIONS TO THE SECRETARY OF LABOR

GAO recommends that the Secretary of Labor direct the Bureau of Labor Statistics to do the following:

--In its role as focal point for implementing the recommendations of the National

Academy of Sciences' Panel to Review Productivity Statistics, use the improvement priorities expressed by users in the General Accounting Office study as one criterion for attaching priorities to the National Academy recommendations.

--Develop a plan for producing multifactor productivity measures for the major sectors of the economy, establish a feasible target date for publishing these measures, determine the associated resources required, and seek authority to carry out the plan.

--Publish additional public information on the interpretation and use of productivity measures. In developing this information, typical problems and misuse encountered during the 1972 Wage Stabilization Program should be considered.

--Confer with the Department of Commerce to determine what technical expertise that Department needs to develop a firm-level productivity improvement program, and at what costs.

RECOMMENDATIONS TO THE SECRETARY OF COMMERCE

GAO recommends that the Secretary of Commerce (1) determine the costs and other resources needed to establish a firm-level productivity improvement program which would have measurement as an important component and (2) if the program appears feasible, seek authority to implement it. Further, Commerce should confer with the Bureau of Labor Statistics to determine what technical assistance Commerce needs and to explore various approaches to such a program. The Federal Government for example, could act as a facilitator or instigator to promote or enable industry associations and other non-Federal organizations to operate the program with minimal Federal effort. One approach Commerce should consider is incorporating voluntary interfirm measurement programs within its present programs to aid

industries, such as the productivity seminars of the metalworking industry program.

AGENCY COMMENTS AND OUR EVALUATION

GAO obtained official comments on a draft of this report from both the Department of Commerce and the Department of Labor. Both departments generally agreed with the need to improve productivity measures, but each raised certain areas of disagreement. Both Commerce and Labor were concerned primarily with the cost and confidentiality associated with firm and interfirm measurement programs. (See p. 39 for detailed comments.) GAO's recommendation regarding the promotion of such programs does not specify or envision that the Federal Government would directly collect and analyze firm-level data. A broad range of approaches should be examined, including one in which the Federal Government's role would be to simply promote or facilitate interfirm programs.

The Department of Labor also believed that it need not do more to inform users and the general public about the nature, uses, and misuses of productivity measures. GAO disagrees. The current economic situation and the recommendations of the users demonstrate clearly the need for a better general understanding of productivity and productivity measures. Since the Bureau is already involved in this area, GAO believes the Bureau should explore ways of increasing such understanding.

Contents

ABBREVIATIONS

BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
GAO	General Accounting Office
GNP	Gross National Product

CHAPTER 1

INTRODUCTION

Government statistics are used extensively to develop and guide Government policies and programs and provide information for a wide variety of private sector users. The importance of good information for these purposes has created an awareness of Government's need to ensure the validity, quality, and usefulness of its statistics. In particular, the importance of good productivity statistics is heightened by the current need for improved productivity to combat inflation.

This awareness was concisely expressed in the National Productivity and Quality of Working Life Act of 1975 which stated that "The Congress finds that * * * there is a national need to develop precise, standardized measurements of productivity."

What led the Congress to recognize productivity measures as a national need was the declining rate of national productivity growth. This decline persists; in the 4 years since the act was passed, productivity growth has slowed even more.

The productivity measures needed to support efforts to improve productivity growth must be appropriate to the particular improvement effort. For example, development of economic policies requires productivity data on overall business economy. Specific action by business, on the other hand, requires information on individual industries and even on narrow subgroups of industries or individual firms.

In the past, productivity measures have been used primarily as general economic indicators to study national economic issues. Today, interest is increasing in productivity measures that aid business managers in assessing the efficiency and effectiveness of their operations.

HOW PRODUCTIVITY IS MEASURED

Productivity is an indicator of how efficiently we use our resources. It refers to the results achieved in relation to the resources used. It is a measure of labor, capital, and other resources needed to produce a given quantity of goods or services. In general, productivity growth means improved economic well-being. As productivity grows, fewer resources are needed for each unit of goods or services produced. If one of the resources used more efficiently is labor, then productivity growth means that more goods or services are available for each person employed.

The concept of productivity is relatively simple; it is the ratio of output (units of products or services completed) to input (resources), such as applications processed per staff hour. Productivity growth usually is measured by comparing current productivity to that of a base period (year). For example, in the base year, both resource inputs and production outputs are given as indexes of 100. The base year productivity, defined as a ratio of output divided by input, is:

$$\frac{\text{Output}}{\text{Input}} = \frac{100}{100} \times 100 = 100 \text{ percent}$$

If, in the second year, the output increases 8 percent and the input increases 5 percent, the productivity ratio reflects an increase in productive efficiency of almost 3 percent, as follows:

$$\frac{\text{Output}}{\text{Input}} = \frac{108}{105} \times 100 = 102.9, \text{ an increase of 2.9 percent over the first year}$$

On both the level of the whole economy and of the firm, there is a tendency to consider only labor as an input. Although labor makes up two-thirds of all input costs for the total economy, this ratio varies by industry. Therefore, in some industries inputs other than labor are used for computing productivity. Further, each of these measures has a separate use and meaning. For example, a measure which shows output per labor hour is best used to explain changes in unit labor costs, while another measure which shows output per unit of energy is best used to show changing efficiency in the use of energy. Still another measure which shows output per unit of both labor and capital is best used to show overall productivity, or the net savings in input costs per unit of output. The combination of labor and capital usually covers nearly all input costs and is sometimes termed multifactor productivity.

GOVERNMENT PROGRAMS FOR PRODUCTIVITY MEASURES

Two Government organizations regularly publish a series of productivity measures for the U.S. economy. The Economic Research Service of the Department of Agriculture annually publishes measures for the farm sector. The Department of Labor's Bureau of Labor Statistics (BLS) publishes a spectrum of measures including the total private business sector, the nonfarm sector, the nonfinancial corporation sector, the manufacturing sector, and about 75 individual industries. BLS also publishes a number of productivity studies, such as a comparison of the American economy's productivity to that of 10 foreign countries. (App. II discusses the BLS measures in more detail.)

Also, the Department of Commerce and the Federal Reserve Board occasionally publish productivity measures. These measures as well as the annual Department of Agriculture measures represent small programs when compared with the BLS measures.

WHY WE DID THE REVIEW

Our concern about productivity measures is an outgrowth of our review of the now defunct National Center for Productivity and Quality of Working Life. 1/ During that review, we examined the various projects initiated by the Center, one of which was funding the National Academy of Sciences' Panel to Review Productivity Statistics. The National Academy convened a panel of 14 experts to examine productivity concepts and the validity and quality of the Government-produced productivity measures.

From our attendance at the panel meetings, review of its work, and discussion with panel members, we observed that user needs were not being systematically identified. Therefore, we performed this study to identify what measurement improvements would be most important to users of productivity measures.

The National Academy panel completed its work and gave its draft report to the National Productivity Council, the successor to the National Center for Productivity and Quality of Working Life. The Council established a task force under the leadership of the Bureau of Labor Statistics to direct implementation of the panel's recommendations.

SCOPE OF STUDY

We interviewed about 50 representatives of over 25 organizations including labor unions, trade associations, firms, and Government agencies. We selected these individuals and organizations because they either were direct users of productivity measures, or they worked closely with organizations and individuals in the use of measures. These users, who were fairly evenly distributed between business, labor, and the Federal Government, were selected from suggestions made by BLS and members of the National Academy Panel, or taken from BLS' mailing list for productivity releases. We believe their opinions generally reflect those of most users.

1/"The Federal Role in Improving Productivity--Is the National Center for Productivity and Quality of Working Life the Proper Mechanism?" FGMSD-78-26, May 23, 1978.

We compiled users' suggested improvements into a questionnaire, which we used to survey the same users to assess the relative importance of each improvement. Three improvements which users considered significantly more important than all others were then examined in greater detail.

CHAPTER 2

USER SURVEY

According to our survey, the Bureau of Labor Statistics' measures of private sector productivity can be improved to aid users. Respondents consistently gave three needs the highest priority: (1) measures of productivity of individual firms, (2) measures of multifactor productivity, and (3) a better explanation of the meaning of measures.

SURVEY RESULTS

The user survey was conducted in two phases. First, we interviewed users to see how they use the measures and to obtain a preliminary list of improvements they recommended. Secondly, we combined the recommendations from all survey participants and the preliminary recommendations from the National Academy Panel into 21 categories. We then submitted the combined list to the participants and asked them to indicate the categories of improvement that are needed most.

The survey disclosed that eight categories of needed improvements were considered high priority by at least half the users. 1/ These eight are as follows:

--Industry measures should be developed for groups of firms, where similarities exist between organizations, and the measures should include even more industries than the BLS publications.

--BLS should provide or make available information which would help interpret the productivity indexes, such as including caveats in releases of productivity indexes and reporting probable margins of error in the data.

--BLS should publish a multifactor productivity measure in which output is related to a weighted average of all major inputs.

1/Many of the recommended improvements would require action by other agencies in addition to BLS because BLS uses some data collected by other agencies. For example, the output data for major sector measures is obtained primarily from the Department of Commerce's Bureau of Economic Analysis (BEA), which uses the data to compute the gross national product and related measures.

--Welfare considerations affecting the output measures, such as environmental health and safety changes, should be accounted for. 1/

--The Commerce Department's Bureaus of the Census and of Economic Analysis should work with BLS to develop consistency in the basic data used for economic analyses; they should try harder to reconcile differences in their estimates of real output.

--Basic data relating to capital stocks should be improved. 1/

--BLS and BEA should improve the price indexes used for deflating current values.

--BLS should produce supplementary measures based on different measures of labor input (such as actual hours spent at the workplace).

Although all recommendations received some votes (showing the diversity of the users), three were rated much higher than the rest. These three were: (1) developing firm-level measures, (2) reporting information to aid in interpreting productivity indexes, and (3) publishing multifactor productivity measures. We examined these three recommendations in detail to determine if they were feasible and what the benefits would be. Our analysis and conclusions follow.

1/BEA is responsible for these measures now.

CHAPTER 3

DEVELOPMENT OF FIRM-LEVEL PRODUCTIVITY MEASURES

One of the most needed improvements to Government measures, according to users of productivity statistics, is a program to aid firms in developing productivity measures and to promote comparisons among firms in similar industries. Other countries use this approach to help improve productivity. In the Canadian program, for example, some U.S. subsidiary firms located in Canada are used for comparison. Thus, the feasibility of such a program is well established.

A firm-level program would benefit U.S. industry by increasing the awareness of and attention to productivity improvement, and may help improve national productivity. This is especially important from the standpoint of increasing productivity growth relative to other countries. Since the degree of Government involvement can vary depending on the program design, we did not estimate the potential cost to the Government.

CURRENT INDUSTRY-LEVEL PROGRAM

For 90 years, pressures to develop particular productivity measures have resulted from the economic conditions of the times. In our discussions with users we found that the same pressures exist today. Most users now see a need to improve productivity in order to combat inflation. They demonstrated this view in our follow-on survey of needed improvements; users overwhelmingly selected as the most needed change the development of refined productivity measures which can be used by managers for firm-level productivity improvement.

Currently, the BLS industry productivity measures are the most refined and disaggregated ones available from the Government. These measures are developed for industries in the manufacturing, mining, transportation, communication, and service sectors. Examples of specific industries in the manufacturing sector are: manmade fibers, steel, aluminum rolling and drawing, and concrete products. BLS publishes about 75 industry measures and maintains another 400 which are deemed of insufficient quality for publication. Although such industry measures are appropriate as industry benchmarks, they are too general for specific productivity improvement activities.

The fact that the current industry measures are more usable for general comparison than for actual productivity

improvement is reflected in the way they are used. Survey participants say they use the currently published 75 industry measures primarily for general economic information when

--indicating lagging and leading industries within the economy,

--providing basic information for academic research on economic issues,

--supporting or refuting a policy or position being advocated (for example, in wage negotiations a union may link company profits with increases in labor productivity--or a company may do the opposite), and

--analyzing the impact of an economic action such as a major wage settlement.

As useful as the BLS industry measures are for these purposes, they do not provide all the types of measures users felt are needed for productivity improvement activities.

NEW PROGRAM OF PRODUCTIVITY MEASURES NEEDED

Survey participants felt that measures useful for productivity improvement should be developed on a level which would show similarities among the groups measured. BLS groups industries according to the major types of products produced or services rendered, using the Standard Industrial Classification (SIC) 1/ system. According to the participants, if industries were grouped using additional factors, such as type and size of organization, technology or process uses, or location, the resulting measures could be used by companies to compare themselves with their competitors. Moreover, when firms are grouped by similarities, comparisons of productivity--that is, output per common unit of input for a period of time--becomes as meaningful as trends in productivity growth. Actual levels of productivity provide managers

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1/The Standard Industrial Classification System classifies establishments into industrial groupings based on types of products produced or services rendered. It is a numerical classification system which becomes more specific as the number of digits increases. For example, a two-digit industry group consists of a broad aggregation such as stone, clay, glass, and concrete products (SIC 32); a three-digit is more specific, such as glass and glassware, pressed and blown (SIC 322); and a four-digit is the most specific, such as glass containers (SIC 3221).

with a key indicator for comparing performance and potential for improvement.

The need for less aggregate measures to make the productivity data more meaningful is exemplified by comments from the coal associations. They pointed out that coal mining operations differ substantially for underground and surface mining, also that surface mining in the Western States differs substantially from that in the Eastern States. To illustrate these differences, we computed some output-per-labor-input comparisons using data published by the Bureau of Mines. The following table demonstrates that mine operators cannot make valid comparisons of their production with overall U.S. production data because the output per staff-day varies widely, depending on type and location.

	Output in net tons per staff-day	
	1976	1975
Bituminous coal mining	14.46	14.74
Underground	9.10	9.54
Surface	26.40	26.69
East of Mississippi	a/	22.38
West of Mississippi	a/	53.62

a/The example shows the overall output for bituminous coal mining is of little use to the companies within the industry for comparing performance. The data becomes more useful as it is segregated until similarities exist within the industry segments being measured.

Profit and competition can be enhanced by an interfirm measurement program

Companies are interested in increasing profits. If they can find ways to produce more and better products or services from a given amount of human and physical resources, their productivity will increase; hence, their profits and competitiveness will increase. Survey participants believe that comparisons of productivity between competitors would provide both needed information and motivation for improving productivity. When firms measure themselves they have taken the first step in improving productivity, but comparing themselves with their competitors provides even more information on the needed action. Comparisons with other firms provide standards

against which a company can establish goals; assess its performance, relative strengths, and weaknesses; and seek corrective action.

The increasing realization that firm measures and interfirm comparisons are important tools in improving productivity and profit is demonstrated by the many private sector initiatives in recent years. We learned that increasing numbers of companies are measuring themselves to find ways to improve their operations. They are becoming involved in programs designed to help them help themselves, for example, the interfirm measurement program of the American Productivity Center.

This center is a privately funded, nonprofit organization which was founded in 1977 with pledged financial and personnel support of over $10 million from 100 national corporations. It is dedicated to developing practical, company-level methods for increasing productivity. One of its goals is to develop multifirm comparisons of productivity data. Although the center may be the largest single effort of its kind, it is not the only one. During this study, we learned of over 30 groups which promote productivity and productivity measurement.

In another example, a drug firm concerned with the impact of Government policies on research and development within the pharmaceutical industry developed interfirm measures of productivity and published them in the September 1977 issue of Pharmaceutical Technology. The article, entitled "Drug-Firm Productivity, R&D, and Public Policy," contains total factor measures of four research and development-intensive firms. These measures were presented as partial evidence that pharmaceutical research and development is a significant determinant of the relatively high productivity of the industry. The author did not claim that the analysis provided conclusive evidence, partly because he had to infer measures of productivity for the firms other than his own since there are no available studies of total-factor productivity of other research and development-intensive pharmaceutical firms. The article pointed out that for such a comparison to be meaningful, a full total-factor productivity study should be undertaken for the individual firms and for the industry as a whole.

A BLS official pointed out two considerations, based on the Bureau's experience in productivity measures, for an interfirm measurement program. First, he believed the focus on firm groupings should be directed more toward similarity of products than similarity of processes. The product grouping approach compares competitors in order to identify causes of differences in productivity, one of which is the

process. He felt that when firms with identical processes are compared, the major differences in productivity will come from sources beyond the control of managers, such as regional differences in education and training.

While we agree that a focus on product groupings is likely to be the most common useful aggregation, there certainly can be differences in the firms with identical processes. Those differences are caused by variations of management expertise and approaches and by variations in the methods of organizing the factors of production.

For example, two different firms may manufacture the same product, using identical equipment. Yet one firm may be better organized and managed. As a result, its equipment may operate a higher percentage of the time, resulting in higher productivity. Equipment operating levels depend on a number of management-controlled factors such as inventory control, production planning and scheduling, maintenance techniques, and employee behavior.

BLS' second consideration was that confidentiality, necessary to prevent disclosure of a firm's operating data, will require special attention in an interfirm comparisons program. We agree with this point.

One method often suggested to avoid public disclosure of individual firms' operating information is to limit the Government's role to fostering and promoting private sector efforts to establish interfirm measurement programs. One possible approach is to encourage firms to work with trade associations. The Federal Government, acting as a facilitator, could provide technical advice and other aid to the associations but not become involved in collecting and computing data. This way, the Federal Government would not be able to release an individual firm's proprietary information, either inadvertently or through a Freedom of Information Act request.

Some trade associations already have been involved in productivity measurement and improvement within their industries. For example, the Air Transport Association of America has developed industry measures of multifactor, labor, and capital productivity in addition to other operating ratios such as operating revenue to sales. Another industry association, the Milk Industry Foundation, published a study of productivity in the fluid milk industry. This study, like the airline industry study, included other operating ratios in addition to productivity measures.

Other countries promote interfirm measures programs

Programs emphasizing interfirm measures exist in other nations including Australia, Austria, Britain, Canada, West Germany, Japan, New Zealand, and Norway. Most of these programs are operated by the respective governments. Some insights into the Canadian program are provided in appendix III.

The notion that this was just another questionable Government program and that the data would be used by the Government for some other purpose was overcome by personally assuring that the data collected would remain confidential and by explaining the specific benefits of participation. The program is now well respected and widely accepted.

The Canadian Government operates and controls the program but utilizes private consulting firms to execute the projects. The program is viewed as the systematic measurement of performance and provides a unique source of scientifically assembled information for the industry sectors. Its purpose is to promote economic growth by giving management a reliable tool to improve productivity, and thus enhance a firm's competitiveness both with Canadian firms and foreign companies.

We learned that small-to-medium firms (50 to 200 employees) make up the majority of program participants, although a few very large and very small firms were included. Of over 700 participating firms, only 2 evaluated the program negatively. As information about the program spread, the response became so great that criteria had to be established for expanding the program coverage.

Although we did not obtain detailed information on specific cases because of the confidential aspects of the program, Canadian Government officials showed us letters from program participants. The general tone of the letters is reflected in the following quotes from two establishments. Significantly, one is a Canadian subsidiary of a U.S. firm.

> "We found the results in some cases what we had expected but in some cases somewhat of a surprise. We intend to use these results on an ongoing basis for comparative purposes and also to increase operational productivity in areas where this appears warranted."

"The information presented is extremely valuable in high-lighting our position in the marketplace and emphasizing areas for improvement in our operation that undoubtedly will result in bettering our overall business productivity * * *."

The success of the program is attributed to the emphasis on quality and personal contact. Quality in all aspects of the program (personnel, analysis, reporting) is stressed. For example, when the Government contracts with a consulting firm to do the work, the firm's selection is based heavily on the participating individuals' qualifications--not the firm's reputation. This approach is viewed as extremely important because of the personal contact the program requires.

CONGRESS SPECIFIED FEDERAL ROLE IN FIRM-LEVEL PRODUCTIVITY IMPROVEMENT

The Congress spelled out the Federal role in national productivity improvement in the legislation authorizing BLS activities. Public Law 426 (Mar. 4, 1913) required that BLS "collect, collate, and report at least once each year full and complete statistics of the condition of labor and the products and distribution of products of the same." This authority was expanded by Public Law 71-537 (July 7, 1930) which states that labor statistics shall be reported by such industries as the Secretary of Labor may prescribe, and by Public Resolution 77 (June 7, 1940) which also authorizes industry studies. However, Public Law 426 provides BLS' basic authority to develop productivity statistics, and further, requires that the relationship of the statistics to the condition of labor be shown.

Also, the National Productivity and Quality of Working Life Act of 1975 states that it is

"the continuing policy of the Federal Government, in cooperation with State and local governments, to use all practicable means and measures; including financial and technical assistance to stimulate a high rate of productivity growth."

So there appears to be ample authority for the Federal Government to take an active role, either directly or indirectly, in firm-level productivity programs. Further, the Federal Government alone has the breadth of authority and concern to deal with these issues on a national basis.

However, a program of measures at the firm level would require a total departure from the current method used by BLS to construct industry productivity measures. It would involve

a program similar to the relatively expensive direct measures program BLS operated in the late 1940s to aid the recovery of European industry. Further, private and other public sector organizations are developing programs to address productivity improvement. Consequently, other agencies now may be better suited to carry out Government efforts to foster and/or facilitate measurement-based productivity improvement activities in the private sector. The Department of Commerce, for example, has a number of programs and initiatives directed toward firm-level productivity improvement.

Department of Commerce firm-level productivity activities

The Department of Commerce, in carrying out its primary mission "to foster, promote, and develop the foreign and domestic commerce of the United States," has tried to enhance productivity in the private sector. Three examples of Commerce's actions are programs designed to

--promote productivity measurement by firms,

--promote productivity in the metalworking industry, and

--compare operating performance.

Commerce initiated the productivity measurement program in July 1975. The program was designed to interest company management in productivity in general and productivity measurement in particular. The program consisted of personal visits with firm officials, productivity measurement seminars conducted by the Bureau of Field Operations' field offices, and a series of bulletins on productivity. Initially, this program was given priority status, but the emphasis has waned in the past 2 years as shown in the following table by the number of seminars.

	Fiscal 1976	Fiscal 1977	First half Fiscal 1978
Number of seminars	39	22	8
Number of attendees	2,132	1,224	452

According to Department of Commerce officials who initiated the program, emphasis on the program was reduced when headquarters personnel assisting with it were lost. Not all field offices had the necessary expertise to conduct seminars, so personnel from Commerce's Office of the Ombudsman had helped with this part of the program. In addition to the reduced emphasis because of lesser headquarters assistance, certain other programs, such as export promotion, recently

have been given greater field office priority. It should be pointed out, however, that such programs do not have goals which conflict with productivity improvement. For example, if export promotion improves total sales and output, productivity gains may be achieved through economies of scale in production.

The second Commerce initiative involves a specific industry--metalworking. Expecting problems for this industry in the near future, Commerce is alerting metalworking firms to potential problems and suggesting ways to combat them. This effort involves

--explaining how productivity can be improved through technology,

--providing information to use in assessing the need for and the financing of technology, and

--demonstrating firsthand the benefits of technology.

Commerce's Office of Business Programs is establishing a program in which competing, similar firms will share data on a confidential basis for comparison purposes. Its purpose is to help participants assess their strengths and weaknesses and identify areas where competitiveness can be improved. This approach seems closely related to the type of interfirm measurement approach envisioned by the users we surveyed. The Office is now examining barriers to be overcome, such as how to maintain confidentiality of data and whether inadvertent disclosure of company data could lead to price fixing or other possible antitrust violations. Office of Business Programs officials pointed out that these issues are not new to the Department, since the Bureau of Census must always deal with confidentiality.

CHAPTER 4

PRODUCTIVITY MEASURES ARE MISUNDERSTOOD

Productivity measures are often misunderstood because the data produced is both improperly interpreted and inadequately presented. The measures have a wide variety of applications, and in several of these the lack of understanding has either prevented the measures from being used or possibly caused policies and regulations to be incorrectly based on the measures.

Although users we talked to recognized that BLS cannot totally educate the public in the use of productivity measures, they felt that more should be done to reduce improper use and enhance the usefulness of the measures.

INFORMATION NEEDED TO AID INTERPRETATION OF MEASURES

Survey participants wanted information reported which would aid understanding of the measures, making them more useful and reducing their misuse. They felt a caveat identifying common misunderstandings should be included with all releases of productivity indexes. For example, several participants explained that the news media often attribute a change in productivity solely to labor effort. Although the index is labor-based, a change in the productivity trend also reflects technological innovation, changes in capital stock and capacity utilization, scale of production, flow of materials, education and skill of the work force, quality of management, and many other factors.

Participants also identified two circumstances under which they believed Government agencies have misused industry measures for regulatory purposes. (BLS is not involved in the requirements to use these measures.) In the first instance, the measures were used in 1972 for implementing economic controls during phase 2 of the Economic Stabilization Program--so far the most extensive use of the measures for other than general economic information. Both published and unpublished BLS measures were used as basic data in developing many of the industry trend rates which were printed in the Federal Register and used to calculate the productivity offset to cost increases in determining allowable price increases.

The second instance of misuse participants identified is the current use by the Interstate Commerce Commission. The Commission requires the trucking industry to use the BLS-published productivity measures when requesting rate increases. The survey participants who were involved in both

the Economic Stabilization Program and the rate increase program pointed out the following as some of the problems associated with using BLS industry measures for regulatory purposes.

--BLS industry measures are subject to varying margins of error, a fact recognized by BLS in that its quality standards bar many measures from publication.

--BLS measures show the trend in labor productivity, but past productivity trends within an industry do not necessarily indicate future trends.

--Since company and industry productivity trends may differ substantially, forcing wages and/or prices to be tied to industry trends could throw off the entire wage/price structure of the industry.

--Since BLS productivity measures are labor based, they are inappropriate measures to use for capital-intensive industries in offsetting costs for price control purposes.

We did not assess whether these uses of productivity data were in fact misuses. BLS officials who have considerable experience in this area said it is not clear that they were misuses. However, since any measure is relative to the purpose for which it is undertaken, and since BLS industry measures were developed to provide insight into labor-oriented concerns such as technological displacement of labor, many users thought the use of these measures for regulatory purposes was inappropriate.

Survey participants also explained that the productivity press releases would be more useful if they were accompanied by data to explain unique factors affecting them. One participant stated that some macroeconomic measures of productivity tend to be misleading because they are based on preliminary estimates of inputs and outputs. He felt they would be less misleading if the probable margins of error in outputs and inputs were also reported, and if fluctuations were explained when possible.

We discussed these problems with BLS officials. They are aware of the possible misuses and misunderstandings and have tried to minimize them, although they feel that BLS has no direct control over how others use the measures. For several years BLS has included in the press releases of industry measures an explanation of measurement techniques and limitations. Last year they added a cautionary and explanatory note to the major sector press releases. They have also issued

a bulletin entitled "The Meaning and Measurement of Productivity," and included three chapters on productivity measures in the BLS Handbook of Methods.

In response to the suggestion that information be furnished to indicate the probable margin of error in the measures, a BLS official pointed out that such an improvement would require action by others than BLS, since BLS primarily uses data collected by other organizations for purposes other than productivity measures. For example, the output data for major sector measures is obtained from BEA accounts used for developing the gross national product. He added that the National Academy panel made the same recommendation, increasing the pressure to develop margin-of-error information. However, BLS must wait until agencies which supply its data improve the data.

CHAPTER 5

DEVELOPMENT OF MULTIFACTOR MEASURES

Users, in responding to our questionnaire, strongly supported having a Government develop multifactor measures of productivity on the total economy level. They pointed out that productivity measures are most useful as a family of statistical indicators which includes measures of labor productivity, capital productivity, energy productivity, and multifactor productivity. Individuals involved in providing input data for macroeconomic decisions, both fiscal and monetary, emphasized the greater scope and accuracy that could be given to economic forecasts if multifactor measures were available.

Measures prepared by BLS traditionally have been based on a single factor input--labor. The primary reasons for developing and maintaining labor-based measures stem first from BLS' legislative basis which requires that all such measures show a relationship to the conditions of labor; and second, from the many difficulties in obtaining appropriate measures of other inputs--particularly capital. As a consequence, those economic analyses and forecasts that use productivity measures as inputs reflect only the changing productivity with respect to the use of labor. For the total economy, and for major sectors such as manufacturing, labor-based productivity measures have been appropriately used as substitutes for multifactor productivity measures because labor constitutes about two-thirds of the input costs. Further, as long as the mix of input costs (for example, the ratio of capital to labor) remains stable, the trend in labor productivity is a useful estimate of overall productivity. However, if a significant shift occurs in the mix of input costs, labor-based productivity is a less accurate indicator of overall productivity.

Although the Government publishes no official multifactor measure except for the Department of Agriculture's farm productivity index, some private sector individuals and organizations do. However, the great effort required to do so has precluded regular publication of multifactor measures by the private sector. Those that have been published showed total economy multifactor productivity growth to be somewhat slower than labor productivity growth for the period prior to the 1973 energy shortage.

MULTIFACTOR PRODUCTIVITY MEASURES COULD IMPROVE ECONOMIC INFORMATION

The Federal Government has established certain policies which spell out its leadership role in promoting a stable and growing national economy coupled with full employment. This role is pursued in part by Federal fiscal and monetary policies and actions. To support such policies and actions a broad range of economic analyses and forecasts are needed. Productivity measures which address the total economy and its major components are used in these macroeconomic analyses and forecasts. For example, the trend in the total economy's productivity growth rate is one of the factors required for computing the potential growth rate of the gross national product (GNP). The potential GNP, in turn, is used as a benchmark for many fiscal policy projections, such as tax revenues. Also, major sector productivity measures are used in analyzing and projecting industrial production and employment changes, which are in turn used as input to monetary policy decisions.

Individuals surveyed who are responsible for preparing fiscal and monetary decisionmaking information pointed out that multifactor productivity measures would improve the quality and accuracy of economic forecasts over those now made using currently available labor productivity measures. As an example, they stated that the recent increase in energy costs appears to affect the types and quantities of capital equipment purchased--thus affecting the mix of capital and labor input costs. One possible explanation for this is the reluctance of a business to buy energy-intensive equipment. This reluctance causes a slowdown in the substitution of capital equipment for labor. Since the substitution of machines for labor is one of the major causes for labor productivity growth, such growth may be slowing more than overall productivity. Therefore, a multifactor productivity measure is needed to more accurately gauge the changing net efficiency of the economy.

Economic analysts also pointed out that by using a multifactor measure with a labor productivity measure, they can compare changes in labor input and changes in capital. Such comparisons would enable economists to more accurately evaluate the belief that a reduced rate of capital formation is contributing significantly to the current slowdown in productivity. The importance of validating this theory is best illustrated by the current pressures on Government to change tax laws to encourage capital investment.

THERE ARE BARRIERS TO PUBLISHING MULTIFACTOR MEASURES

There is general agreement among economists on the conceptual basis for developing multifactor measures--particularly a labor-plus-capital (plant and equipment) input measure. Labor hours and machine hours should be combined using an appropriate weighting scheme. Although no comprehensive data is available to measure machine hour trends, economists generally agree that total real stocks of capital can be substituted for machine hours. However, certain major data problems and conceptual problems relative to using capital stocks have been consistently pointed out not only by BEA officials who collect and publish the data, but also by BLS officials and other economists:

--Economists disagree on whether capital stock should be computed as a gross figure, as gross minus depreciation, or as some combination of the two.

--If depreciation is considered and capital stocks are so adjusted, new depreciation schemes must be developed and used because most available depreciation rates are based on tax law compliance rather than on true economic depreciation.

--The quality of the capital investment data is weak for a number of reasons, such as lack of readily available base year prices to use in adjusting data.

--Quality changes and improvements in the productive capacity of capital equipment are difficult to determine.

BLS PLANS TO DEVELOP MULTIFACTOR MEASURES

BLS has initiated efforts toward eventually publishing a multifactor measure on a continuing basis. Lack of universal agreement among economists prevents BLS from developing a multifactor measure that will have total acceptance. However, BLS officials believe it is necessary to start a multifactor measurement program now so that (1) sufficient data can be collected to resolve many areas of dispute and (2) necessary historical data can be compiled.

For several years BLS has been conducting work related to multifactor productivity measurement in conjunction with efforts to understand the changes in labor productivity. BLS also has an individual in its productivity research program who works on issues basic to eliminating the barriers to

publishing a multifactor measure, and sufficient capital data has been developed to begin research on the effects of changes in the capital-labor ratio. This data was the basis for a recently published BLS study on the effects of the energy crisis on productivity, and will aid in developing a foundation of data for a multifactor measure.

However, a BLS official cautioned that expectations of a multifactor measure based on current data would be premature; capital data required for a published measure must be of much higher quality than data which is acceptable for research studies. He stated that BLS is moving in this area as aggressively as possible with its available resources.

CHAPTER 6

CONCLUSIONS, RECOMMENDATIONS, AND AGENCY COMMENTS AND OUR EVALUATION

CONCLUSIONS

The role of productivity improvement in a healthy economy has recently been recognized, but much remains to be done to foster this improvement.

The first step in improving productivity is to have productivity measures that can be used

--to identify weaknesses, establish goals, formulate action, and assess progress at the firm level; and

--to analyze and act on economic policy.

Existing BLS productivity measures can always be improved, as can any statistical measure, by becoming more current and more representative. However, the most needed improvements in the BLS measures, from the users' standpoint, are:

--Developing a new productivity measurement program which is directed toward promoting productivity improvement at the firm level. The measures should cover groupings of similar firms and would enable managers to assess their own firm's progress in improving productivity and allow them to compare their productivity level and progress with similar organizations. Such a program would not necessarily require that the Government collect and analyze data. It could be operated by groups of firms through arrangement with trade associations or similar organizations, with the Government playing the role of facilitator and technical advisor.

--Providing more information to aid in interpreting and understanding productivity measures. Such information could prevent users from drawing wrong conclusions or taking unsubstantiated action based on the measures, which can happen in both the Government and the private sector.

--Developing multifactor productivity measures for the macroeconomic sector such as for the private business economy. This improvement would enable users to more

clearly identify the need for particular fiscal or monetary actions.

In addition to the three improvements identified by users of productivity measures as being highly important, five other improvements were also identified as important by over half the users surveyed.

RECOMMENDATIONS TO THE SECRETARY OF LABOR

We recommend that the Secretary of Labor direct the Bureau of Labor Statistics to take the following actions:

--In its role as focal point for implementing the recommendations of the National Academy of Sciences Panel to Review Productivity Statistics, use the improvement priorities expressed by users in our survey as one of the criteria for attaching priorities to the National Academy recommendations.

--Develop and seek authority to carry out a plan for producing multifactor productivity measures for the major sectors of the economy, establish a feasible target date for publishing these measures, and determine the associated resources required.

--Publish additional public information on the interpretation and use of productivity measures. This information should be developed with consideration of typical problems encountered during the 1972 Wage Stabilization Program.

--Confer with the Department of Commerce to determine what technical expertise should be provided that Department for developing a firm-level productivity improvement program, and at what cost.

RECOMMENDATIONS TO THE SECRETARY OF COMMERCE

We recommend that the Secretary of Commerce (1) determine the funding and other resources needed to establish a firm-level productivity improvement program which would have measurement as an important component and (2) if the program appears feasible, seek authority to implement it. Further, Commerce should confer with the Bureau of Labor Statistics to see what technical assistance Commerce needs and to determine various approaches to such a program, including having the Federal Government act as a facilitator or instigator to promote or enable industry associations and other nongovernmental organizations to operate the program with minimal Federal effort. One approach the department should consider

is incorporating voluntary interfirm measurement programs within their existing programs to aid industries, such as the productivity seminars or the metalworking industry program.

AGENCY COMMENTS AND OUR EVALUATION

Both the Departments of Commerce and Labor provided official comments to our draft report in which they generally agreed that improvements in productivity measures are needed. The comment letters from both departments are included as appendix IV. Only those issues where there is some disagreement or misunderstanding are discussed here.

Both departments acknowledged the value of productivity measurement at all levels including the firm level. However, both were concerned, and rightly so, with the issue of cost and confidentiality in an interfirm comparison program. We do not disagree and we raised these issues in the report.

An interfirm measurement program based on extensive data collection and analysis of firm-level data by the Federal Government would be costly. For just this reason we suggested that the Commerce Department explore various alternatives such as having the Federal Government act as a facilitator or instigator to enable nongovernmental organizations to operate such programs. As we pointed out in chapter 3, the Commerce Department's Office of the Ombudsman and Bureau of Field Operations have done some outreach work which could provide a forum for promoting interfirm measurement activities, yet would avoid having the Federal Government become directly involved in data collection, analysis, or use.

To further clarify our original recommendation, we have added a suggestion on possible approaches the Department should consider. We also recognize that after study and evaluation, the Commerce Department may determine it is not feasible for them to promote interfirm measurement programs. Therefore, we have stated in our recommendation that the department should seek authority to carry out the program, should the program be feasible.

The Commerce Department also pointed out that individual firm data is not necessary for constructive programs to stimulate productivity growth. We agree and have not intended to infer that the Commerce Department programs, such as export promotion, are not useful for improving productivity. To insure that such a conclusion is not erroneously drawn from the discussion in chapter 3, we have made certain clarifying changes to the draft report reviewed by Commerce.

The Department of Labor expressed concern about the proposal in our draft report that our user survey be used to attach priorities to the National Academy of Sciences' proposed changes to the productivity statistics. They suggested that the user survey was a valuable additional criterion for developing priorities, but that other criteria also must be considered. We believe that the Department is correct and have modified our proposal accordingly. The Department also requested additional information on the representativeness of the 50 users in our survey. This information is included on page 3.

The Department of Labor also does not agree with our recommendation that they increase the interpretative and general information provided to users and potential users of the measures. The Department points out in its comments, and we state in our report, that BLS already provides descriptions of the methods used to derive the productivity measures, noting limitations in the data, and other information. It stressed that BLS' role was to develop measures, not say how the data should be used. However, we feel that the current national productivity downturn, the awareness of and emphasis being given to productivity from many quarters, and the fact that users raised the need for more information to aid in understanding the statistics, taken together all constitute a basis for suggesting even greater information dissemination by BLS.

COMPILATION OF

IMPROVEMENTS SUGGESTED BY USERS

To determine the improvements to the productivity measures that users felt were most needed, we researched the subject area and interviewed about 50 individuals from 25 organizations. These individuals fairly evenly represented labor, business, and the Government, and included those who either directly use productivity measures, or assist and advise others who use the measures. The organizations contacted included trade associations and industry organizations which, through their economic research units, have a continuing interest in productivity measurement and improvement.

After our indepth research on necessary improvements, we compiled the suggestions and supplemented them with recommended improvements from the draft report of the National Academy of Sciences' Panel to Review Productivity Statistics. To insure technical accuracy in developing the combined list, we were assisted by Professor John W. Kendrick of George Washington University, an expert in productivity measurement.

To rank the recommended improvements, we sent the list to each participant, requesting that a priority of 1 through 7 be assigned to the most needed improvements. When the lists were returned, we used a reverse numerical system (7 through 1) to calculate priority points. In addition, we counted as a point the number of times each recommendation was assigned a priority. We then used the total points to establish priorities by category and by specific improvements. These recommendations are those of users, and do not constitute our recommendations. The first three user recommendations are the basis of our recommendations.

1. The BLS industry-level productivity measures need to be expanded

   --by the number of industries covered,

   --in detail by technology used, similarity of firms (including size), geographic regions, and process used.

2. BLS should provide or make information available that would aid in interpreting the productivity indexes, specifically:

   --Improved descriptions of the methodology used in developing the indexes.

--Information on the sources and definitions of data and data collection techniques.

--Cautionary notes in the releases of productivity indexes which will explain commonly misunderstood material.

--Reports of further investigations on probable margins of error in outputs, inputs, productivity data revisions, and ratios and their components.

3. The Government should publish a multifactor productivity measure (sometimes called total factor), in which output is related to a weighted average of all inputs.

4. The Government should account for welfare considerations such as environmental, health, and safety changes that affect output measures; and such changes should be incorporated in

--currently published measures of productivity or

--productivity measures which supplement current measures.

5. Interagency cooperation should be promoted to aid in developing consistency in the basic data used for economic analyses, for example:

--The Census Bureau should share its Standard Statistical Establishment List with other agencies.

--Agencies should find methods of exchanging data without violating the rights of companies supplying the data.

--Agencies which develop measures of real output should try harder to reconcile differences in their estimates and agree upon a uniform measure.

6. Basic data relating to capital stocks should be improved. Improvements should include

--increasing the accuracy of inventory estimates and fixed capital outlays and

--developing factors for estimating the life of fixed capital goods at time of retirement.

7. BLS and BEA should improve the existing price indexes used for deflating current values, for example:

   --Auxiliary measures of price change should be developed to account for quality changes not now measured, such as increased durability, reduced maintenance costs, and improved performance without added costs.

   --More current price change data should be developed for measuring intermediate consumption levels.

8. Annual supplementary productivity measures should be produced in which the current labor hours paid for input are replaced by

   --actual hours spent at the workplace,

   --current hours plus supervisory and nonproduction workers' hours paid for,

   --actual hours at workplace, nonproduction, and supervisory workers.

9. The Government should develop and publish a capital input productivity measure, based on available estimates of real capital stocks.

10. The Government should research, develop, and maintain measures of the sources of productivity growth.

11. BLS should prepare and use weighted labor input measures for developing productivity indexes. Such input measures should take into account the quality of the work force as reflected in pay differentials.

12. The Government's efforts should be expanded in determining measures of output and productivity in areas where statistical and conceptual problems exist, such as hospitals, various professional services, and upper level management.

13. The Government should develop and publish an intermediate input (energy, material, and other purchased items) productivity measure based on available measures of intermediate inputs.

14. The Government should promote and encourage private research into the causes of productivity growth

--on the macro-level, or overall level, of the economy and

--on the micro-level, or individual industry or regional level, of the economy.

15. The Government should support efforts to develop more meaningful international comparisons of productivity.

16. The basic data on intermediate products should be improved by expanding the Census Bureau's Annual Survey of Manufacturers in the areas of material, energy, and service inputs.

17. BLS should publish productivity measures promptly.

18. The Government should further develop international productivity measures, including measures of the causes of productivity change.

19. A new set of productivity measures should be developed which are less aggregated than the current major sector measures (for example, total private economy, nonfarm, and manufacturing sectors) yet are more aggregated than the industry-level measures (for example, steel, auto, and coal industries).

20. Development and publication of productivity measures should be reduced.

--The volatility of productivity indexes should be reduced by reducing their frequency of publication.

--No measures of productivity should be published at all, because users ascribe undue reliability to Government statistics.

--Suggested measures of multifactor productivity should not be published because people may think they are more accurate than they are.

21. The Government should foster the development of firm-level productivity measurement, for example through awareness programs that would encourage companies to develop their own measures.

Although we grouped related recommendations by using the distinctions that appeared most important to the users, other groupings were possible. For example, we could have grouped all suggestions relating to measuring capital inputs

APPENDIX I

or measuring labor inputs. However, this would have made little change to the priority issues, and would not have changed the top three recommendations.

BUREAU OF LABOR STATISTICS

INDUSTRY PRODUCTIVITY MEASURES PROGRAM

The Bureau of Labor Statistics' Industry Productivity Research Division develops and publishes productivity measures for about 75 industries in the manufacturing, mining, transportation, communications, and service sectors. In addition, the Bureau maintains but does not publish separate measures for over 400 industries in the manufacturing sector. (Industries, in the Bureau's terms, are industries as defined by the Standard Industrial Classification system developed by the Office of Management and Budget.)

The decision to publish a new measure is based on an evaluation of the accuracy and conceptual basis of the measure developed. In addition to an in-house examination of the validity of newly developed measures, two committees--one representing labor and another business--review the measures.

BLS' current objective for the program is to develop and publish productivity measures for all industries within the U.S. economy. To accomplish this, the current operating goals for the Industry Productivity Research Division are to

--increase the number of measures to get a better representation of the diversity of productivity changes within the major sectors and

--balance the coverage on major problem areas by developing productivity series for the hard-to-measure industries.

PROGRESS AGAINST OBJECTIVES

The Standard Industrial Classification Manual classifies 977 private industries at the most specific, or four-digit, level. Given the overall goal of the program and management's preference to develop measures at this level, about 9 percent of the goal has been reached. In terms of percentage of the labor force covered, the measures reflect the output of about 25 percent of the labor force in the business sector. The following table shows the coverage by level for the major sectors of the economy, excluding Government, and the relationship of the measured four-digit industries to the total four-digit industries.

Number of Industries Now Measured

Sectors	Total 4-digit industries	4-digit	3-digit	2-digit	Groupings which contain a mix of 4-digit	3-digit	2-digit
Agriculture	61						
Mining	42	a/ 2	1	b/ 2			b/ 1
Construction	26						
Manufacturing	452	29	8		16		
Transportation, communication, electric, gas, and sanitary services	69	c/ 3	c/ 1		1	1	
Wholesale trade	61						
Retail trade	64	2		2			
Finance, insurance, and real estate	71						
Services (other than sanitary)	131	1	1	-	-	-	-
Total	977	37	11	4	17	1	1

a/Each 4-digit industry has two measures using different output measures.

b/Shown as 3-digit, but 3-digit is the same as the 2-digit level; therefore, used highest aggregation.

c/Two partial measures of Standard Industrial Classification 401 and 4213, using different output measures, are also counted here.

As shown, 37 of the 977 four-digit industries, or combinations thereof, are measured at this level of detail. The other measures represent broader aggregations, primarily to

--make the data base large enough for statistical purposes and

--make the data reliable enough to meet the criteria for publishing an official measure.

BLS is reviewing the measures at broader levels of aggregation to determine how many may now be disaggregated to the four-digit level.

BLS is also doing feasibility studies of all four-digit industries in the major sectors of manufacturing, retail trade, and services to determine if data is available for productivity measurement. From these, industries will be selected for measurement.

To further its operating goals, BLS has a program plan which shows that (1) the number of industry measures will be increased in 1980, (2) the hard-to-measure industries will be emphasized, and (3) additional professionals will be required for 1980 exclusively to study and develop productivity measures for such industries as shipbuilding, aircraft, and medical services.

According to Bureau officials, to expect that we will someday have a measure for each of the 977 private industries is unrealistic. Most industries at the four-digit level will not have published measures because of the unavailability and unreliability of the basic data needed--particularly the output data. However, as each additional general measure is established, a new piece of information becomes available for general economic analysis and academic research.

APPENDIX III

THE CANADIAN

INTERFIRM MEASUREMENT PROGRAM

We met with officials of the Canadian Department of Industry, Trade, and Commerce to learn about their interfirm measurement program. This appendix describes the program as explained by those officials, and is not based on independently verified evidence of the program's success. The officials did, however, show us letters from program participants, an overwhelming majority of whom expressed satisfaction with the program.

The recognition that productivity improvement benefits labor, business, and the public led the Canadian Department of Industry, Trade, and Commerce to develop its interfirm comparison program. The program was initiated a few years ago with a small staff and very few other resources. Nevertheless, the staff completed a number of interfirm comparison projects in such diverse fields as men's suits, home furnishings, heating and air conditioning equipment, chemical fabric and film producers, diecasters, furniture manufacturers, and computer services.

The original objective was to analyze the relative productivity of participating firms in order to help them diagnose and eliminate their weaknesses. The staff soon realized, however, that to obtain the cooperation of firms they had to concentrate on profitability analysis which was of direct concern to the firms. Productivity measures were then built into the systematic analysis of profitability.

Canadian companies that make similar products or a similar mix of products, have comparable volumes of sales, share comparable marketing and technology, and regard one another as competitors, are invited to take part in a given comparison project on a voluntary and confidential basis. Those that agree to participate provide operating statements and balance sheet data as well as other essential background information, including physical productivity data if available and meaningful. The most useful information varies from industry to industry; for instance, in labor-intensive industries, more information will be needed on labor requirements, while in capital-intensive industries more detail is wanted on capital available and used. To reduce the burden on participants, the Government agrees in each case with industry representatives about the most useful and meaningful measures to be sought.

The data is analyzed, and a confidential report is written to the chief executive officer of each participating firm.

The report identifies areas of relative strengths and weaknesses and provides a basis for planning improved performance. Also the results are discussed in followup interviews which the firms regard as perhaps the most useful part of the process because these sessions tend to prompt immediate corrective action.

USE OF OPERATING RATIOS

Each firm in each comparison is unique and calls for a unique approach. Basically, some 20 to 25 ratios are devised to reflect standard operating ratios such as material, labor, overhead, and selling; administrative and financial costs as a percentage of sales; and a set of supplementary ratios more specifically designed to indicate productivity such as value added per staff-year or staff-hour, valued added per dollar of machinery and equipment, or square feet of leather per pound of hide.

The analytical system is based on the return earned on the total investment in the company. The measure of return that is used is operating profit as a percentage of operating assets. Operating assets are defined as the assets actually employed in the production process of the enterprise, both fixed and current, excluding such items as marketable securities, investment in other enterprises, goodwill, or other intangibles. Operating profit is defined as the income earned in employing the operating assets, calculated after depreciation at standardized rates but before deducting interest and taxes; thus, it represents the total earnings of all operating assets regardless of how they are financed. This ratio of operating profit to operating assets is the primary ratio of the comparison; it measures the earning power of the business and indicates whether management is using its resources effectively.

The other ratios in the set are chosen for their direct effect on the primary ratio. Specifically, they use the fact that the profit margin (operating profit/sales) multiplied by the asset turnover (sales/operating assets) must equal the primary ratio; hence, an increase in either the profit margin or the asset turnover will increase the return on assets. They therefore extend the comparison to the various costs per sales dollar that determine the profit margin and to the various categories of assets (buildings, equipment, inventories, and receivables) in proportion to sales. Also, Canadian analysts examine various productivity and other supplementary ratios that afford insights into why differences have arisen in the basic ratios. Finally, these analysts consider the background information to see whether differences in the ratio

pattern may be partly or mainly explained by differences peculiar to the firm's particular operation.

RATIOS TO MEASURE PRODUCTIVITY

Many of the financial measures suggest underlying productivity relationships. For example, the lower the total production labor cost as a percentage of production, the higher the value added per staff-hour is likely to be. Similarly, the lower the manufacturing overhead as a percentage of production, the higher the value added per dollar of capital input is likely to be. Also, the asset turnover rate suggests the rate of asset utilization.

Nevertheless, the financial ratios are supplemented by as many relevant productivity ratios as meaningful and practicable on the basis of available data. For example:

--General information is obtained on percentage utilization of fixed capital.

--Quite often it is possible to compare physical output per staff-hour measures, such as dozens of pairs of pants produced, tons of steel fabricated, or square feet of leather made per staff-hour of production worker.

--Other types of useful relationships are developed when appropriate; for instance, the ratio of pounds of metal cast per unit of energy or the number of pairs of pants per yard of material.

BENEFITS OF INTERFIRM COMPARISON

The results of the interfirm comparisons, which let participants compare their performances in detail with their competitors' on a systematic and anonymous basis, have proved very useful. For example, in the findings of only a dozen comparisons, the value added per staff-hour by comparable firms in each industry varied by 17 to 112 percent between the median and best performer, and by 75 to 314 percent between the lowest and best performer. Value added per multifactor input basis (value added per both labor and capital inputs) yielded similar results. These differences suggest a significant potential for performance improvement in most industry sectors.

The practical value of systematic performance measurement has become evident again and again. The comparisons have, however, not only led to this general conclusion but indicated specific improvement potential in materials management, labor

management, production management, as well as in sales and promotion, administration, and finance. The comparisons have drawn attention in a number of cases to the need for better utilization of physical and/or financial assets, better time management, and an optimum choice of product variety.

In addition to these immediate benefits, it is expected that such interfirm comparisons will encourage greater use of performance-oriented management information systems and provide firms with a framework within which they can systematically monitor their progress.

APPENDIX IV

UNITED STATES DEPARTMENT OF COMMERCE
Office of Inspector General
Washington, D.C. 20230

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Mr. D. L. Scantlebury
Director, Financial and General
Management Studies Division
U. S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Scantlebury:

This is in reply to Mr. Eschwege's letter of December 20, 1979, requesting comments on the draft report entitled "Expanded Government Productivity Measurement Program Can Aid Private Sector Productivity Improvement."

We have reviewed the enclosed comments of the Chief Economist for the Department of Commerce and believe they are responsive to the matters discussed in the report.

Sincerely,

Mary P. Bass
Inspector General

Enclosure

APPENDIX IV

UNITED STATES DEPARTMENT OF COMMERCE
Chief Economist for the Department of Commerce
Washington, D.C. 20230

January 15, 1980

Mr. D. L. Scantlebury
Director
Financial and General Management
Studies Division, Room 6001
441 G Street, N. W.
Washington, D. C. 20458

Dear Mr. Scantlebury:

The Commerce Department agrees with many of the recommendations contained in the GAO report "Expanded Government Productivity Measurement Program Can Aid Private Sector Productivity Improvement." The recent slowdown in productivity growth is an issue which deserves greater attention and analysis than most economists in the public and private sectors have given it. In fact, improvements in our programs relating to productivity measurement are now underway in the Department and constitute only one part of the Department's expanding program to analyze and promote productivity growth.

Consistent with several of the report's recommendations, the focus of our current efforts to better measure and analyze productivity is on disaggregation by industrial sector and study of individual factor (including energy and materials) productivity. We believe this to be useful for understanding productivity trends, in light of the diverse rates of productivity growth in different goods and service-producing industries and the shifts in input mix which have been occurring in response to dramatic increases in energy prices. Improvements in our productivity performance can result from a better understanding of industry-specific production structures and how they are affected by such factors as energy prices, tax policies, regulatory policies, demographic changes in the labor force, business cycles, and monetary and fiscal policies. Such studies will be a major emphasis of the Department's newly-formed Bureau of Industrial Economics, which was created to strengthen our capability for microeconomic analysis.

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The data required for analysis of productivity by very detailed industry break downs, especially in the nonmanufacturing and service sectors, is not generally available or accurate enough for use. The Census Bureau and Bureau of Economic Analysis (BEA) are fully aware of the limitations of current data and the need to expand our data base, but restrictions imposed by budget and paperwork burden limitations prevent significant expansion of data collection programs. The attached addendum of technical remarks notes some of these proposed improvements.

Some of the same kinds of restrictions prevent the Department from developing firm-level data for productivity analysis. Any large-scale program of statistics for individual firms would entail enormous budget costs and paperwork burden beyond the currently imposed limits on Federal program spending and survey activities. In addition, serious questions of data confidentiality would be raised. For these reasons, the Department does not place priority on those recommendations emphasizing firm-level data, believing that the attention and support required to carry out the other recommendations will absorb all the resources we can devote to this area.

We do not believe, however, that individual firm data are necessary for constructive programs to stimulate productivity growth. The Department's efforts to help firms in troubled industries, such as those facing serious import competition, are useful and effective ways of stimulating higher productivity based on general knowledge about industry-wide problems. Cooperative programs with the business community designed to stimulate innovation and other avenues to better productivity are currently operating in the Office of Science and Technology, Economic Development Administration, Maritime Administration, and National Oceanic and Atmospheric Administration. In addition, the export promotion emphasis of the International Trade Administration (ITA) mentioned on page 22 of the draft report encompasses productivity improvement programs. (The report's implication that these two goals are competing for the resources of the ITA field offices is a misleading one.)

In summary, the Commerce Department places a high priority on the measurement and study of productivity trends as well as programs designed to help businesses improve their productivity. Established programs of productivity analysis and encouragement and the expansions now underway demonstrate this concern, although resource limitations prevent the implementation of all of the report's recommendations.

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Thank you for the opportunity to comment on this draft report.

Sincerely,

Courtenay Slater

Courtenay M. Slater
Chief Economist for the
Department of Commerce

Attachment

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UNITED STATES DEPARTMENT OF COMMERCE
Bureau of the Census
Washington, D.C. 20233

OFFICE OF THE DIRECTOR

JAN 10 1980

MEMORANDUM FOR Courtenay M. Slater
Chief Economist
for the Department of Commerce

From: Vincent P. Barabba
Director
Bureau of the Census

Prepared by: Shirley Kallek/Census/763-5274

Subject: Comments on the Draft of the Proposed GAO Report on Productivity

In reviewing the proposed GAO report, we note that many of the recommendations appear to parallel those proposed from the detailed study undertaken by the Reese Committee of the National Academy of Sciences. As indicated in the report, the National Productivity Council is considering the recommendations of the Reese Committee and has established an interagency task force to consider the implementation of their recommendations. 1/

Comments relating to specific recommendations contained in the draft GAO report follow:

1. Page 8 and Appendix I; Page 40, Recommendation No. 4: Interagency Cooperation and Exchange of Data

   a. The GAO recommendation comes without any recognition that there already is substantial interagency cooperation in the compilation of the 5-year Census index of production and the derived output per worker hour indexes. In the Census project, the staffs of BEA, the Price and Productivity Sections of BLS, and the FRB cooperate to review the selection of price deflators to be used by Census. The resulting output indexes are compared with similar data that the other agencies compile. For some industries, this review led to the correction of the initial Census estimates before publication; for other industries, it led to the acceptance of the Census data as the more correct, with the subsequent adjustment in the other agency's series.

   b. On a more current basis, the "Real Output Committee" has been re-activated by the OFSPS. This Committee is made up of the agencies that have a direct interest in the compilation of real product (BEA, FRB, BLS, DOE, and Census). The Committee has met on several occasions in recent months and is in the process of developing an agenda of problems that should be addressed.

1/The GAO recommendations referred to are those of the users survey, not GAO recommendations.

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c. Sharing of data among statistical agencies has been proposed by the President. Draft legislation is being prepared that specifically addresses the sharing of the Bureau's Standard Statistical Establishment List with other agencies.

2. Appendix I, Page 41, Recommendations No. 6 and No. 9: Capital Stocks and Inventories

This recommendation on improving capital stocks relates to the Census Bureau, although it does not explicitly say so. The Reese Committee was quite explicit about the additional survey work needed to improve productivity data and their recommendations are being reviewed by an interagency committee headed by BLS. The Census Bureau has made a number of improvements in its collection of inventories as a result of the earlier GNP Committee recommendations. Since that Committee was concerned also about the "real" or "constant dollar" GNP, many of their recommendations foreshadowed those of the Reese Committee. In its annual survey and monthly reports, Census now collects inventories broken down according to their FIFO, LIFO, and other accounting method proportions. It is considering other improvements; for example, collecting information on inventories by type of product and turnover rates, and capital stocks by type of capital and age of capital. These improved collection programs would provide disaggregation of capital items that would permit the application of more precise price indexes to convert book capital to real capital for use in productivity studies. However, no funding is currently available to implement these recommendations.

3. Appendix I, Page 42, Recommendation No. 13: Intermediate Products

Census has given consideration in recent years to expand the annual survey of manufactures to collect information on detailed materials consumed, and to provide tabulations of product class shipments by industry. These proposals were also in response to the recommendations of the GNP Committee and the Reese Committee. All of them are directed toward improving the calculation of real gross output and the calculation of real value added for use in the GNP and productivity studies.

4. Appendix I, Page 42, Recommendation No. 19: Appendix II: Disaggregated Measures of Productivity

This, too, has been recommended by the Productivity Commission and is being reviewed by the various agencies. Standing in the way of more industry detail than is currently published is the basic obstacle of developing estimates of real output at such detailed levels. BLS currently restricts the number of industries for which it calculates annual productivity indexes because it considers the data for other industries of questionable value. For internal purposes, they have been calculating real output

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and derived measures of productivity for all SIC's in the manufacturing sector. However, they consider these estimates of dubious value primarily because their measures of real output are derived by crudely deflating at the 4-digit industry level the value of shipments and inventory data of the annual survey of manufactures. Calculation of more solid real output measures depends on the derivation of better price indexes (these are currently being worked on at BLS) and the more detailed information from the annual survey of manufactures mentioned above; i.e., product classes shipments by industry, detailed materials consumed, and better information on inventories and capital stocks.

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ADDENDUM TO JANUARY 10, 1980 MEMORANDUM FROM BUREAU OF THE CENSUS TO CHIEF ECONOMIST

ABBREVIATIONS

BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
DOE	Department of Energy
FRB	Federal Reserve Board
FIFO	First In First Out
GAO	General Accounting Office
GNP	Gross National Product
LIFO	Last In First Out
OFSPS	Office of Federal Statistical Policy and Standards
SIC	Standard Industrial Classification

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U. S. Department of Labor

Inspector General
Washington, D.C. 20210

FEB 1 5 1980

Mr. D. L. Scantlebury
Director
Financial and General Management
Studies Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Scantlebury:

This is in reply to your letter to the Secretary of Labor requesting comments on the draft GAO report entitled, "Expanded Government Productivity Measurement Program Can Aid Private Sector Productivity Improvement."

The Department's response is enclosed.

The Department appreciates the opportunity to comment on this report.

Sincerely,

MARJORIE FINE KNOWLES
Inspector General

Enclosure

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U.S. Department of Labor's Response To
The Draft General Accounting Office Report
Entitled
Expanded Government Productivity Measurement
Program Can Aid Private Sector Productivity Improvement

Recommendations: The Secretary of Labor direct the Bureau of Labor Statistics to take the following actions:

1. In its role as focal point for implementing the recommendations of the National Academy of Sciences Panel to Review Productivity Statistics, the Bureau should use the improvement priorities expressed by users who were contacted as part of the General Accounting Office study to attach priorities to the National Academy recommendations.

Response: The Department would concur with a modified form of this recommendation. The NAS Panel made 23 recommendations for the improvement of productivity measures. In determining the priorities to assign to these recommendations many factors have to be taken into consideration. These include (1) the significance of the recommendation, that is, how the recommended change would affect the quantity and the quality of the productivity measures; (2) the feasibility of the recommendation, that is, the availability of the data, the additional collection needed, and the technical obstacles to present; and (3) the costs involved. The expressed needs of the universe of users of the productivity measures should be taken into account as an important additional criterion but not be the sole basis for establishing the priorities of implementing the recommendations of the NAS Panel. Even though a recommendation may have highest priority for the respondents to the GAO survey, it may be more effective to give higher priority to a recommendation which is feasible, of very low cost and significant, but is not the principal recommendation of the respondents.

Moreover, the recommendations of the users surveyed by the GAO may or may not be representative of the universe of users of the productivity measures of the government. The report fails to indicate what the composition of the users surveyed was (other than to mention that they were 50 representatives of over 25 organizations drawn from unions, the private business sector and government agencies). The composition of the group could have a great deal to do with the priorities recommended. As pointed out on page 7, the top priority item recommended by the GAO survey of users was the need for measures of individual firms' productivity. If the sample of the users surveyed was dominated by plant managers from the private sector, it is understandable how this could be a very high priority need.

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However, the productivity measures of the government are developed to meet a variety of needs, one of which is to provide for policymakers an economic indicator for assessing the performance of the economy, major sectors and industries. If the sample of users was dominated by economic policy makers in the government--both in the legislative and executive branches--the highest priority recommended could well have been improvement of the measures for the economy and major sectors.

At a minimum the GAO report should indicate the composition of the sample surveyed with the relative importance of the various groups so that better conclusions can be drawn in evaluating the responses.

2. Develop a plan for producing multifactor productivity measures for the major sectors of the economy; establish a feasible target date for publishing these measures and determine the associated resources required; and seek authority to carry out the plan.

Response: The Department concurs with this recommendation. The BLS has already made the development of these measures a major item in its planning for the productivity measurement program and has already prepared a plan examining the feasibility, scope, costs etc., for developing the measure. The quality of this undertaking will in part be dependent on improvements in data collected by BLS and by agencies other than the BLS (for example, improved inventory and capital investment data from the Bureau of the Census, more complete data on energy use from the Department of Energy).

There is a misstatement on page 33 about the BLS efforts in this area. The BLS activities in multifactor analysis are broader than "one individual in its productivity research program." Work related to the multifactor productivity measurement area has been conducted by many individuals in the BLS Office of Productivity and Technology in connection with understanding the changes in output per hour of all persons (the present measure). Since labor productivity change reflects the contribution of capital relative to labor as well as the many other factors affecting the use of labor input per unit of output, the BLS in its reports on productivity change going back to 1972, at least, has included some assessments in the reports of the impact of capital input change on productivity change. The capital measures used were cruder than those which would be suitable for a multifactor measure but related work has been going on for several years and mention should be made of it in the report.

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3. Publish additional public information regarding the interpretation and use of productivity measures. This information should be developed in consideration of typical problems and misuse such as encountered during the 1972 Wage Stabilization Program.

Response: The Department does not concur with this recommendation.

Statistical agencies such as the BLS in developing data have the responsibility to develop the most reliable measures possible, to describe the methods used for deriving the measures, and to spell out the limitations of the measures in terms of adequacy of the data. It is not feasible nor desirable for statistical agencies to say how the data should or should not be used for economic or other policy determinations. This is particularly undesirable with regard to productivity measures since these data can be involved in a variety of aspects of economic policy--growth policy, wage and price determination, and management policy etc.

The BLS has published frequently descriptions of the methods used to derive the productivity measures pointing out limitations in the data, gaps and imputations which have been made. It also publishes statements in each bulletin and its press releases that the labor productivity measures reflect the impact of other factors as well as labor's contribution to the change in output per hour. In part the problem of the lack of awareness of the limitations of the measures on part of the users may be one of dissemination of the background information rather than the need for more descriptions. However, this was not addressed by the GAO report.

The recommendation for information on the use of the productivity measures does not follow from the responses of the users in the survey. On page 7, for example the users felt that the usefulness of BLS measures would be improved by "a better explanation of what the measures mean." This is not the same as providing information on the use of the measures. Explanations of the meaning of the productivity measures have been provided by the BLS, none of which were cited in the GAO report. For example, BLS issued Bulletin No. 1714 with the title "The Meaning and Measurement of Productivity" and the BLS Handbook of Methods has three chapters on the derivation, and limitations of the productivity measures it publishes.

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In connection with the use of the productivity measures in the 1971-72 Economic Stabilization Program, there is a factual error on page 25 of the GAO report. It is stated that "Both BLS published and unpublished measures were printed in the Federal Register and were used to offset increase in costs...". In fact the BLS measures were not printed in the Federal Register. The Price Commission (not the Cost of Living Council) issued in the Federal Register industry trend rates which it derived and were to be used to offset increases in costs. These rates were derived by the Price Commission, not the BLS. The BLS measures were sometimes used by the Price Commission for deriving the rate, but in many cases were not used at all. For example, there were no negative industry growth rates printed in the Federal Register although the long term trend rates for a number of industries based on the BLS data were downward. The BLS is not in the position, nor should it be in the position, to recommend to policy making organizations or the public that it should or should not use the measures for policy purposes. It has the responsibility to provide the data, explain how they are developed and present their limitations.

In connection with the use of the data in the Economic Stabilization Program, the GAO report assumes that the incidents cited by the participants in the survey as misuse of the data were in fact misuses. It is not at all clear that the Price Commission or the ICC actions were or were not misuses of the data.

Recommendation: The Bureau should coordinate with the Department of Commerce to determine what technical expertise should be provided the Department for developing a firm level productivity improvement program and at what costs.

Response: The Department concurs with this recommendation.

Other Comments:

On page 12, the GAO report calls for "a new program of industry measures" suggesting that "industries be grouped using additional factors such as type and size of organization, technology or process uses." In fact, the present industry classification used in the BLS measures is the finest disaggregation within the Standard Industrial Classification (SIC) system--the four digit level. The groupings suggested by the GAO report are an extension of a plant productivity measurement program, not an industry program.

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In connection with a proposed plant productivity measurement program no mention was made in the report of the exorbitant cost such a program would entail, the additional response burden it would place on the public, and little mention was made of the problems of confidentiality which would arise. As an example of the confidentiality difficulties, under present interpretations of the confidentiality legislation, the BLS cannot utilize for purposes of plant productivity the separate plant data collected by the Bureau of the Census and therefore would have to duplicate a collection effort to develop relevant plant measures.

RECOMMENDATIONS OF THE PANEL TO REVIEW PRODUCTIVITY STATISTICS

The following is the published list of recommendations from the National Academy's Panel to Review Productivity Statistics. The similarity between the panel's list and our list stems partly from the fact that we interviewed some panel members and their advisors while the panel was in session, and partly from the fact that users of productivity statistics often suggested the same improvements that the panel decided upon.

The recommendations are listed here without the supporting rationale. The rationale and comprehensive data are presented in the Panel's publication. 1/ The order of listing does not imply priority of need.

1. The Panel recommends that the Bureau of Labor Statistics give more prominence in its publications and press releases to cautionary statements warning against misinterpretation of its output-per-hour measures.

2. The Panel recommends that the Bureau of Labor Statistics study the size, direction, and other characteristics of past revisions in estimating output per hour and, on the basis of its findings, consider publishing in its press releases a range of probable revisions (based on experience) for the preliminary estimates.

3. The Panel recommends that the Bureau of Labor Statistics and the Bureau of Economic Analysis explore methods for estimating the implications of error reduction in component measures to reduce overall error in productivity measures beyond that corrected by routine revisions.

4. The Panel recommends that the Bureau of Economic Analysis and the Bureau of Labor Statistics seek to improve their existing price indexes and to develop auxiliary measures of price change. These new

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1/ Measurement and Interpretation of Productivity, Panel to Review Productivity Statistics, Committee on National Statistics, Assembly of Behavioral and Social Sciences, National Research Council, National Academy of Sciences, Washington, D. C.

auxiliary measures should take into account more adequately the types of quality change that are not now measured. They should be a collaborative effort of BEA and the productivity and price research divisions of BLS.

Among the adjustments that could be incorporated in the new measures are adjustments (through better linking procedures) for changes in value to users resulting from the introduction of improved products; estimates of the value to users of improvements in performance that are achieved without increases in real costs; and estimates of the present value of future savings in operating efficiency made possible by design changes and improvements.

Since many of the proposed adjustments would require background studies and additional research, they could not all be incorporated simultaneously into a single new output measure to be used for productivity analysis. Instead, the output measure could be revised periodically, perhaps every 5 years, as new research evidence becomes available on the importance of unmeasured quality change both in the current and previous periods.

5. The Panel recommends that research on the measurement of the output and productivity of the resources in excluded sectors be expanded. However, alternative measures of output for such systems as health care and higher education should not be prematurely selected or foreclosed.

6. The Panel concludes that many useful analyses of economic and social welfare issues can be undertaken within the framework of output and input used in the current official measures. However, the Panel does agree that for the study of many important social problems--for example, improvement of the health status of the population--definitions of output and input that go well beyond those currently used to measure productivity are required. The Panel believes that for each of these special problems, partial and special measures of output and input should be developed when possible. However, the Panel concludes that it is not now possible to add or subtract such special measures from the conventional measures of output and productivity to construct a meaningful single index of overall welfare for the Nation.

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7. The Panel recommends that the Bureau of Labor Statistics develop an annual supplement to the current employment statistics program requesting data on the actual hours of nonproduction and supervisory workers.

8. The Panel concurs with the recommendation of a 1976 BLS task force recommending that a separate annual survey of hours at the workplace be administered to a subsample of the establishments responding to the current employment statistics.

9. The Panel recommends that the Bureau of Labor Statistics devote more resources to studying the use of weighted labor input measures. The purpose of this effort would be to prepare one or more weighted measures of labor input for broad aggregates of economic activity, such as the private business sector. Such weighted labor input measures could be used alone and could also be used in combination with measures of capital input to measure changes in multifactor productivity. Both of these measures could help in explaining the changes in the single-factor unweighted measure of labor productivity.

10. The Panel recommends that the Census Bureau, in its quinquennial economic censuses and annual economic surveys, collect data on beginning and end-of-year inventories by method of valuation. The censuses and surveys should also provide fuller coverage and greater detail on capital outlays, book values of invested capital (gross and net of depreciation), and on depreciation allowances and retirements. The data should distinguish major types of equipment by major industry. The Panel also recommends that a sample survey of the age distribution of fixed assets (by type) and of retirements (by age) during the previous year be taken to keep current the retirement factors used in estimating capital stocks.

11. The Panel recommends that Government agencies make use of available estimates of real capital stocks to develop ratios of output per unit of capital to determine the savings that have been achieved over time in physical capital per unit of output.

12. The Panel recommends that the Census Bureau in its periodic reports on real gross output for detailed industries based on successive quinquennial censuses, include estimates of the real amount of intermediate

purchases of materials, including energy, for those detailed industry categories for which data is available.

13. The Panel recommends that to improve the quality of the annual measures of industry productivity the Census Bureau augment the annual survey of manufacturers (and other annual surveys) to include subcategories of the materials input categories.

14. The Panel endorses the recommendation of the GNP Data Improvement Project calling for the Census Bureau to collect, as an integral part of each economic census, data on the purchases of intermediate services as well as materials by establishments.

15. The Panel recommends that the Bureau of Labor Statistics experiment with combining labor and other inputs into alternative measures of multifactor productivity.

16. The Panel recommends that the Bureau of Labor Statistics and the Bureau of Economic Analysis take joint responsibility for developing and maintaining measures of some of the sources of growth (such as changes in physical capital and workforce composition) so that policymakers can have timely and accurate information on at least the more easily measurable sources of productivity change.

17. The Panel recommends that Government agencies support research aimed at improving knowledge about the sources of productivity change. These agencies should be especially attentive to research that focuses on measuring technical and organizational change and new product and service innovation. The Panel also recommends funding micro-level studies of the returns to research and development. Micro-level studies of innovations in personnel management and other organizational behavior should also be encouraged.

18. The Panel supports legislation that would allow the Census Bureau to share with other Federal statistical collection agencies the Standard Statistical Establishment List, so that all those agencies could sample from a common universe, making the basic economic data more comparable.

19. The Panel stresses the urgency of finding a solution to the problem of coordinating data collection and

allowing data interchange among the Federal statistical collection agencies for statistical and research purposes, in such a manner that the rights, benefits, or privileges of individual respondents are not violated.

20. The Panel recommends that the relevant agencies try to reconcile their different output measures that cover the same industry or sector to improve the measures and to acquire a better understanding of measurement problems associated with weighting, deflation, and other procedures. This can be achieved by strengthening the existing mechanisms in Government that bring the agencies together, such as committees formed by the Office of Federal Statistical Policy and Standards.

21. The Panel recommends that companies investigate whether having measures of productivity would improve their performance, planning, and evaluation. It encourages the Departments of Labor and Commerce to continue to inform companies of the potential benefits of productivity measurement programs.

22. The Panel recommends continued and increasing support for the work of the International Comparisons Project, along the lines suggested by the Statistical Office of the United Nations. The Panel recommends that international organizations provide the financial support necessary to implement the proposals and urge U.S. representatives to these organizations to support the proposals.

23. The Panel endorses continued support for private research on international productivity comparisons, with some enlargement of its scale as opportunities for useful projects arise. The Panel also believes that research within Government should be expanded along lines to be determined by the relevant agencies and adjusted on the basis of their experience. As an important component, we suggest, once the Bureau of Labor Statistics and the Bureau of Economic Analysis have established a program to provide growth accounting series on a regular basis for the United States, they extend their series to other industrial countries.

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