UNITED STATES
GENERAL ACCOUNTING OFFICE

An Assessment Of Capacity Utilization Statistics-- Strengths And Weaknesses

Differences in industrial capacity utilization rates reported by seven organizations for 1970 through 1975 ranged from 10.2 to 22 percentage points. The variations in the rates are caused by differences in data collection, calculation methods, and definitions of capacity. All of the capacity utilization statistics reviewed have weaknesses.

GAO recommends that the Director of the Office of Management and Budget (1) develop a family of capacity definitions for use in calculating the statistics and (2) assign to a Federal organization or organizations the responsibility for developing a single reliable set of rates for use by Government and non-Government users.

CED-77-3

OCT. 28, 1976

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

B-163762

The Honorable John Y. McCollister
House of Representatives

Dear Mr. McCollister:

You requested that the General Accounting Office investigate the extent of unused industrial capacity and the adequacy of the figures provided by the Department of Commerce and the Federal Reserve Board. As agreed with your office, rather than surveying industrial capacity utilization ourselves, we reviewed the adequacy of capacity utilization statistics prepared by Government and private organizations.

We determined how each preparer's capacity utilization series was constructed. This phase included reviewing sources of data, assumptions used, and methodologies employed. Based on discussions with users and preparers of the statistics and articles written about the statistics, we identified characteristics which we used to determine the strengths and weaknesses of the different series.

All of the capacity utilization statistics reviewed have weaknesses. In addition, different definitions of capacity exist creating problems in obtaining consistent survey responses used in calculating several series. We identified three Federal organizations which calculate statistical series on capacity utilization. We question the need for three Government series.

The fact that each series has weaknesses combined with the problems of differing definitions of capacity and a wide variation between capacity utilization statistics indicate that these statistics should be used in conjunction with other economic data and not as a sole indicator for evaluating economic conditions.

In addition, we believe that, in decisionmaking, the individual industry rates are more important than overall manufacturing rates. The composite rates tend to smooth extreme fluctuations and therefore may not point out problems in specific industries. The individual industry rates will provide a better picture of capacity utilization for the different industries.

We obtained comments from the Office of Management and Budget and the seven preparers of the statistical series, and we considered their comments in finalizing the report. The four private organizations generally agreed with our assessment of their series. The comments of the Office of Management and Budget, Department of Commerce, and Board of Governors of the Federal Reserve System are included as appendixes VI, VII, and VIII, respectively.

BACKGROUND

We identified seven organizations which have prepared or do prepare industrial capacity utilization statistics. They are:

--McGraw-Hill Publications Company;

--The Federal Reserve Board;

--Wharton Econometric Forecasting Associates, Inc.;

--The Conference Board, Inc. (series discontinued 1975);

--Bureau of Economic Analysis, Department of Commerce;

--Bureau of the Census, Department of Commerce; and

--Rinfret-Boston Associates, Inc.

McGraw-Hill conducted its first annual survey of capacity utilization in the spring of 1956. The Federal Reserve Board and Wharton began preparing their series in 1956 and 1957, respectively.

In May 1962 the Subcommittee on Economic Statistics of the Joint Economic Committee held hearings on the problem of measuring productive capacity and capacity utilization. The Subcommittee's report noted that (1) the hearings were directly related to congressional action on economic policies--such as tax, monetary, debt, wage, and employment--and (2) any actions on such matters required an understanding of the relationship between the economy's output and its productive capacity.

Based on testimony from preparers and users, the Subcommittee determined that

--interest in capacity statistics was widespread;

--no generally accepted conventions, rules, or definitions for standardized measurement of capacity existed; and

--capacity statistics existing at that time were inadequate in coverage, detail, reporting regularity, and standardization.

The Subcommittee recommended, among other things, that:

--The Bureau of the Budget, now the Office of Management and Budget, lead a cooperative effort to develop (1) generally acceptable standards for defining capacity and (2) guidelines to be followed in preparing measurements of capacity and its utilization.

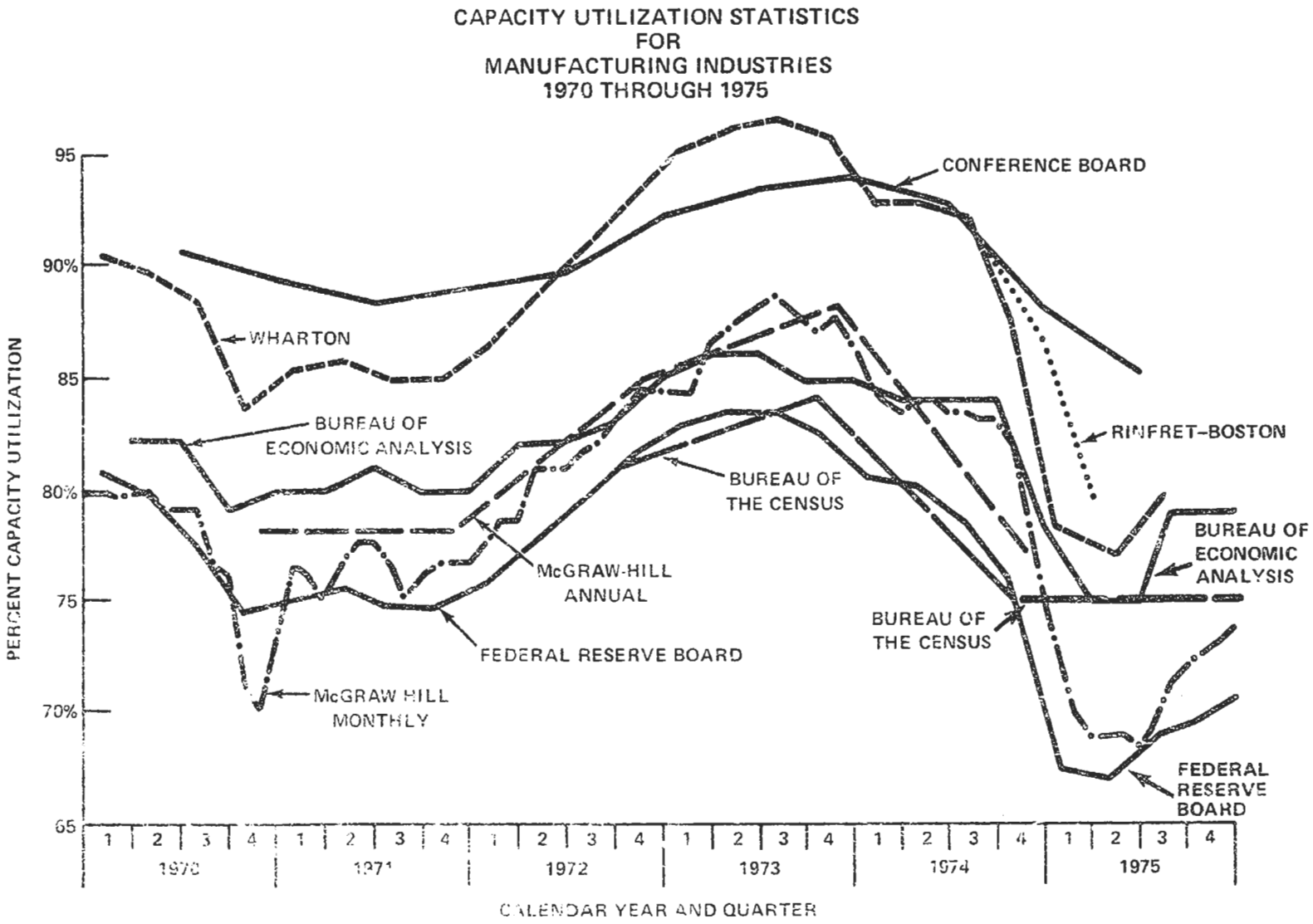
--The Federal Government test the feasibility of using regular Census surveys to gather additional capacity data.

Four organizations (the Conference Board, Bureau of Economic Analysis, Bureau of the Census, and Rinfret-Boston) initiated their statistical series on industrial capacity utilization after the 1962 hearings. One of these organizations, Rinfret-Boston, performed its first survey in the fall of 1974 after concluding that Government statistics on capacity utilization were inaccurate and misleading.

The graph on page 4 shows the utilization statistics for manufacturing industries calculated by these organizations for the years 1970-75. As the graph shows, the differences in the rates ranged from 10.2 to 22 percentage points for the period.

Concept of capacity

The major problem in measuring capacity utilization results from problems in measuring capacity. Capacity is an economic concept that generally refers to the maximum quantity of output per unit of time using existing plant and equipment. Different approaches may be used in measuring capacity and can result in different estimates of total available capacity and of capacity being used. For example, the Bureau of Economic Analysis describes three different approaches--engineering,


CAPACITY UTILIZATION STATISTICS
FOR
MANUFACTURING INDUSTRIES
1970 THROUGH 1975
PERCENT CAPACITY UTILIZATION
95
90%
85
80%
75
70%
65
CONFERENCE BOARD
WHARTON
BUREAU OF
ECONOMIC ANALYSIS
RINFRET-BOSTON
BUREAU OF
THE CENSUS
McGRAW-HILL
ANNUAL
BUREAU OF
ECONOMIC
ANALYSIS
BUREAU OF
THE CENSUS
FEDERAL RESERVE BOARD
McGRAW HILL
MONTHLY
FEDERAL
RESERVE
BOARD
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
1970
1971
1972
1973
1974
1975
CALENDAR YEAR AND QUARTER

maximum practical, and preferred--for measuring capacity. In each case it is assumed that the supplies of labor and other inputs are unlimited.

Each approach results in a different measure of capacity. According to the engineering approach, capacity is the output, based on machine ratings, which can be produced when plant and equipment operate continuously, 24 hours a day, 7 days a week. Under the maximum practical approach, capacity is the output which can be produced using normal operating schedules and all facilities including those which are expensive and inefficient. Finally, under the preferred capacity approach, capacity is the output which can be produced by adjusting operating schedules to maximize profits. (Several articles suggest that preferred capacity is 90 to 95 percent of maximum practical capacity.)

Different estimates of total available capacity and capacity utilization will result depending upon the approach used. In addition, industry and company operating practices differ in areas such as number of shifts, days worked per week, and product mixes. These practices also cause variations in capacity and capacity utilization estimates.

Uses of capacity utilization statistics

Capacity utilization statistics are being used for a variety of purposes, mostly in decisionmaking. In some cases the trend shown by the statistical series is the basis for decisions. In other cases, the level of the reported utilization rates serves as the basis for decisions.

Varying interpretations may be made of a reported capacity utilization rate. For example, under the engineering approach an 88-percent utilization rate may indicate that 12-percent excess capacity is available leaving ample room for increases in production. However, it may also indicate there is limited excess capacity if industry does not wish to push utilization above the preferred rate--the rate at which production results in maximum profits.

Also, manufacturers who report excess capacity may actually be operating at their maximum production level

because of the unavailability of labor, materials, or other inputs required in the production process.

The preparers and users do not agree on the adequacy of the existing capacity utilization series. In spite of these problems, preparers and users of the statistics believe they are useful if their limitations are recognized.

EVALUATION OF THE STATISTICS

Variations in capacity utilization statistics also result from differences in collection and accumulation methods. Two of the series reviewed are calculated from secondary information, four from direct survey information, and one from both secondary information and direct survey information. The series calculated from direct survey information also vary as a result of differences in sampling method, sample coverage, sample size, survey level, and response rate.

We identified several characteristics which can be used to evaluate capacity utilization statistics. We divided the characteristics into two categories--those applicable to all series and those applicable to series involving direct surveys of businesses.

The characteristics applicable to all of the capacity utilization series relate to definition of terms used in publications, calculation frequency, adjustments for seasonal changes, data accuracy, and publication timeliness. Characteristics applicable to series based on direct surveys relate to sampling method, sample coverage, sample size, survey level, definition of questionnaire terms, and response rate. (See app. IV.)

Using these characteristics, we found that each of the reviewed series have both strengths and weaknesses. (See apps. III and V.)

NEED FOR STANDARD CAPACITY DEFINITIONS

The most frequently raised complaint about capacity utilization statistics was the lack of a standard definition of capacity.

Only the Bureau of the Census has provided specific definitions for all of its respondents to use. According

to the Census definitions, practical capacity is the greatest level of output a plant can achieve within the framework of a realistic work pattern and the preferred level of operations is the level of operations which the plant would prefer not to exceed because of costs or other considerations. Other preparers of statistics using surveys to collect information do not provide a definition to all of their respondents because they believe a single definition for all industries cannot be established.

Because of different concepts of capacity and different industry practices regarding the use of capacity, developing a standard definition is difficult. Census, for example, when reporting the results of its capacity utilization survey, noted that it was extremely difficult to translate the concept of plant capacity into a working definition applicable to all industries.

Conclusion

The need for generally accepted standards for defining capacity was noted in 1962 hearings by the Subcommittee on Economic Statistics of the Joint Economic Committee. This need still exists. However, we recognize there are practical limitations to developing a single capacity definition for all industries.

Agency comments and our evaluation

The Department of Commerce noted that the current Census definitions seem appropriate for the majority of U.S. industries but the fact that certain industries have difficulties applying the definitions may distort the estimates for these industries and the higher level totals which include these industries. The Department said that

> "If a series of definitions were constructed which could be applied to particular industries, it would establish a firmer base for the development of capacity estimates."

The Federal Reserve Board noted that

> "The underlying conceptual and statistical difficulties are of such a magnitude, that a fully acceptable standard definition of capacity and utilization cannot be promulgated yet."

The Office of Management and Budget noted that additional research should be done in the area of the level of capacity--the engineering, maximum practical, and preferred approaches to measuring capacity. The Office also noted its leadership role in developing the only specific definitions of capacity currently in use.

In our discussions with users and preparers of capacity utilization statistics, we were informed that a single definition could not be developed that would be appropriate for all industries. We therefore believe a family of capacity definitions should be developed for use in preparing the Government's capacity utilization statistics. Such a variety of definitions would permit the selection of the most applicable definition for each industry. Because only certain industries have difficulties with Census' current definitions, we believe efforts can be concentrated to develop appropriate capacity definitions for the few remaining industries. This would allow for more consistent responses within individual industries.

Recommendation

We recommend that the Director of the Office of Management and Budget continue the Office's leadership role by developing, with interested organizations, a family of capacity definitions for use in calculating capacity utilization statistics.

QUESTIONABLE NEED FOR THREE GOVERNMENT SERIES

The Bureau of the Census, the Bureau of Economic Analysis, and the Federal Reserve Board each prepare composite manufacturing rates, certain aggregated rates, and individual industry rates. There are variations in the level of detail and the methodology used to calculate the rates. However, we question the need for three Federal Government organizations to prepare capacity utilization statistics.

Under section 103 (31 U.S.C. 18b) of the Budget and Accounting Procedures Act of 1950, as amended, the Office of Management and Budget has been given broad authority over statistical activities of agencies in the executive branch. Also, under the Federal Reports Act (44 U.S.C. 3501 et. seq.)

which provides for coordination of Federal reporting requirements, the Office can designate a single agency 1/ to collect certain information in cases where the Office believes the needs of two or more executive branch agencies will be served by a single agency. The Office of Management and Budget took steps along this line when it issued, on December 22, 1975, an amendment to its Circular A-46 pertaining to statistical information. The amendment designates the Bureau of Labor Statistics and the Bureau of the Census to collect State and local labor force and unemployment data. No other executive branch agency is to collect such data without the Office's written approval. We think it is appropriate to take similar steps with the Government's capacity utilization statistics.

All three Federal utilization series have weaknesses.

--Census conducts an annual survey, which is not frequent enough to show short-run fluctuations in capacity utilization. However, Census conducts a plant-level survey, which is necessary for the detail published in the Census series.

--The Bureau of Economic Analysis conducts a quarterly survey which shows short-run fluctuations in capacity utilization but the survey is at company level which may result in misclassification of prominent secondary activities. A company response generally would cover a company's plants and lines of activity. The response is classified by industry according to its primary activity. Consequently, for diversified companies whose activities cross industry classifications, the major secondary lines of activity are misclassified distorting the rates calculated for the individual industries.

1/The designation authority applies to those agencies over which the Office of Management and Budget has jurisdiction. Certain executive branch agencies, such as the Internal Revenue Service, and the independent regulatory agencies are excluded from Office of Management and Budget control.

--The Federal Reserve Board publishes individual industry rates for certain materials industries but only publishes composite utilization rates in its manufacturing series. The composite rates do not provide industry detail and tend to smooth extreme fluctuations. As a result, the statistics may fail to point out potential problems relating to production capacity in specific industries.

In addition, the Bureau of Economic Analysis' and Census' utilization series, in our opinion, are not published within sufficient time for use as current economic indicators. The Federal Reserve Board's manufacturing series generally has been published in a timely manner but, as previously stated, provides only limited information. The Board's new total materials series is published monthly.

Conclusions

Because of important uses of the capacity utilization series in economic policy decisionmaking and the weaknesses in the Federal series which we have noted, we believe the Federal Government should work toward preparing a highly reliable capacity utilization series. To this end, we proposed in a draft report to the Office of Management and Budget and the Federal organizations which prepare the capacity utilization statistics, that the Office designate a single Federal collecting organization to calculate a capacity utilization statistical series. We also proposed that the Office oversee the designated organization's implementation of the series.

Agency comments and our evaluation

The Department of Commerce, the Federal Reserve Board, and the Office of Management and Budget disagreed with our proposals and suggested that all currently prepared Government series be continued.

Both the Office and the Federal Reserve Board agree that there has been some confusion on the part of users because of the number of capacity utilization rates published. The Federal Reserve Board stated that reducing the number of Government series will not eliminate the problem of differences in the utilization rates because of the existence of rates published by the private organizations. The Office stated that the public confusion from the three Government series will be reduced

significantly after the Federal Reserve Board improves its methodology.

Although there would continue to be differences between a single series prepared by the Federal Government and the privately-prepared series, we believe that simply because these differences will continue to exist is not a valid reason to delay the development of a single reliable utilization series by the Federal Government. We also do not believe that simply improving the methodology used in the Federal Reserve Board's series will be sufficient to end the confusion surrounding this complex economic indicator.

The Office said that there are important interrelationships between the existing series and other statistics published by the Federal agencies. To centralize the data series, such as with a quarterly establishment-based survey at Census, would sever the relationships the Bureau of Economic Analysis company-based series maintains with other company-level data, and the Federal Reserve Board's series from the industrial production index.

The Department of Commerce stated that there were two primary uses of capacity utilization statistics--to assess potential bottleneck situations and to assess the profits outlook and potential investment decisions. Census' capacity utilization statistics relate to the establishment or product level and are useful for assessing bottlenecks. The Bureau of Economic Analysis' capacity utilization statistics focus on the company level where profits are generated and investment decisions are made. The Department believes the two series are largely complementary and serve specific users.

In our review, we developed a list of characteristics for analyzing this economic indicator. Based on the characteristics, our evaluation of capacity utilization statistics indicates that the overall capacity utilization rate is misleading and not a useful economic tool, but that rates by industry are useful. We noted that company-level data will result in misclassification of data if diversified companies are included in company-level capacity utilization surveys. For example, a company classified by major activity as part of the rubber industry may report it is adding 10 percent to its capacity when, in reality, the addition may be completely in a secondary line, such as chemicals. The statistic prepared

at the company level, however, would show an investment was being made in rubber.

We noted that the private companies, which also used company-level surveys, considered the company-level survey to be a weakness in their own series.

The Federal Reserve Board stated that, while various capacity utilization surveys indicate approximate utilization rate levels, the utilization rates derived from detailed production series show greater cyclical movements than do the survey-based series. The Board concluded that both sources should be used to estimate capacity utilization rates, stating a minimum requirement for a series based on detailed production data and one based on an establishment level survey.

We note that the Board's production-based series can be estimated more frequently than a survey-based series. If the production series shows cyclical movements which reflect actual changes in capacity utilization, we believe the Board's proposal to have both a production-based series and a less frequent establishment-based survey has merit. Accordingly, we have revised our initial proposal.

In view of the problems with the present Government series, the Office of Managment and Budget, with interested organizations, should determine which organization or organizations have the best capability to prepare a single capacity utilization statistical series for the Government. The best possible methodology should be used to insure the preparation of a highly reliable series. The Government's position would then be represented by a single set of rates for use by Government and non-Government users. The series should be designed to provide the necessary detail to meet the needs of the different Government and non-Government users for policymaking and other purposes.

Recommendations

We recommend that the Director of the Office of Management and Budget:

--Determine, in consultation with interested organizations, the Federal organization or organizations which can most efficiently calculate a reliable capacity utilization statistical series.

--Work with the organization or organizations to develop and implement this capacity utilization series, taking into consideration other Federal organizations' and private companies' needs and correcting the weaknesses existing in the current capacity utilization series.

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As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the House and Senate Committees on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We will contact your office in the near future to arrange for the release of the report so that the requirements of section 236 can be set in motion.

Sincerely yours,

Comptroller General
of the United States

Contents

APPENDIX I

JOHN Y. McCOLLISTER
SECOND DISTRICT, NEBRASKA

WASHINGTON OFFICE:
217 CANNON OFFICE BUILDING
202-225-4155

DISTRICT OFFICE:
FEDERAL BUILDING
215 NORTH 17TH STREET
OMAHA, NEBRASKA 68102
402-221-3251

Congress of the United States
House of Representatives
Washington, D.C. 20515

COMMITTEE OF
INTERSTATE
FOREIGN COMM

SUBCOMMITTEE ON
COMMERCE AND FINANCE

THE SELECT COMMITTEE
ON SMALL BUSINESS

January 27, 1975

Elmer B. Staats, Comptroller General
General Accounting Office
Washington, D. C.

Dear Mr. Staats:

The Congress will soon be considering legislation to stimulate industrial production and increase the number of jobs for American workers. To that end, it is indispensible that the Congress have available the best information possible about the present condition of the economy.

In the enclosed article, from Dun's Review, by economist Pierre A. Rinfret, the question is raised that our data on unused industrial capacity is erroneous. I should like the General Accounting Office to investigate the extent of unused industrial capacity and the adequacy of the figures provided by the Department of Commerce and the Federal Reserve Board.

Your early attention to this request is most respectfully requested.

Sincerely,

John Y. McCollister

JOHN Y. McCOLLISTER
Member of Congress

JYM/rhg

PREPARERS AND THEIR METHODOLOGIES

The seven organizations included in our review use information obtained through direct surveys of businesses or secondary information to calculate their capacity utilization statistics. The following table shows the year each preparer introduced its statistical series, the duration of the series, and the type of information used by the organizations to calculate their series.

	Series introduced in (year)	Series duration (note a)	Type of information used to calculate series
McGraw-Hill	1956	1955 to present	Secondary information and direct survey
Federal Reserve Board	1956	1948 to present	Secondary information
Wharton	1957	1947 to present	Secondary information
Conference Board	1970	1970 to 1975	Direct survey
Bureau of Economic Analysis	1974	1965 to present	Direct survey
Census	1974	1973 to present	Direct survey
Rinfret-Boston	1974	1974 to present	Direct survey

a/Three organizations have made data available for years prior to the series introduction.

MCGRAW-HILL PUBLICATIONS COMPANY

McGraw-Hill Publications Company conducts an annual survey and obtains secondary information to calculate monthly statistics showing a composite capacity utilization rate for manufacturing industries, separate rates for mining industries and electric and gas utilities, and rates for individual manufacturing industries. The composite monthly rate for manufacturing industries is published in "Business Week" magazine and data on specific industries is sold by subscription. The results of the annual survey are published

as part of an annual survey report on businesses' plans for investing in new plants and equipment.

Utilization rates are prepared by McGraw-Hill's Economics Department which compiles and publishes data on various economic topics. The Department conducted its first annual survey on capacity utilization in the spring of 1956 and reported data for the end of the previous year. Since then it has calculated end-of-year rates for every year. McGraw-Hill started to compute monthly capacity utilization rates in October 1964.

Survey questionnaires are currently sent to about 1,800 companies in 21 manufacturing, utility, and mining industries. McGraw-Hill claims a response rate of 56 percent.

McGraw-Hill does not define capacity for its respondents nor does it ask respondents to indicate their meaning of capacity when responding to its questionnaires because it believes the definition of capacity varies from industry to industry and company to company, and even within companies.

McGraw-Hill's methodology

McGraw-Hill obtains the monthly changes in production from the preliminary Federal Reserve Board's Index of Industrial Production and calculates the percentage change in the production index for each industry. Changes in capacity are obtained from the McGraw-Hill annual industry survey which includes a question on planned investment in plant and equipment for the next calendar year. Monthly changes in capacity are obtained by dividing the annual planned investment (expressed as a percentage of existing capacity) into 12 equal monthly amounts.

Preliminary monthly capacity utilization rates for each industry are determined through the following procedure.

1. The previous month's production index (considered to be 100 percent) is adjusted by the percentage change in the index. For example, if the production index was 110 for the previous month and 115 for the current month, the percentage change in the production index would be 4.55 percent and the adjusted production index would be 104.55.

2. The previous month's capacity (also considered to be 100 percent) is adjusted by the calculated percentage change in capacity. For example, if the capacity was 102.5 in the previous month and was 105 for the current month, the percentage change would be 2.4 percent and the adjusted capacity figure would be 102.4.

3. The adjusted production index figure (derived in 1) is divided by the adjusted capacity figure (derived in 2) and the resulting percentage is compared to 100 percent to determine the change in the utilization rate.

4. The previous month's utilization rate is adjusted by the calculated change in the rate to determine the current month's capacity utilization rate for the industry.

To obtain a composite monthly capacity utilization rate for the manufacturing, utility, and mining industries, the Federal Reserve Board's value-added weights 1/ of industrial production are applied to each industry's capacity utilization rate.

The monthly preliminary rates are subject to two types of changes. The first change accounts for changes in the Federal Reserve Board's preliminary Index of Industrial Production.

The second change occurs when McGraw-Hill obtains information on actual company investments for the calendar year as opposed to the planned investment along with company reported capacity utilization information. This information is obtained by McGraw-Hill in its annual survey. McGraw-Hill annually publishes capacity utilization rates

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1/The value-added weights are used as a means to classify industries according to their relative importance. The value added by each industry represents the value added to purchased materials in the process of fabricating them into finished or more nearly finished goods. The value-added figures are developed by subtracting the cost of inputs (such as materials and supplies) from the gross value of produced products.

based on reported end-of-year capacity utilization of the industries surveyed. The preliminary monthly capacity utilization series is revised based on actual reported capacity utilization and actual reported investment of the surveyed industries.

FEDERAL RESERVE BOARD

The Federal Reserve Board publishes two capacity utilization series--one for manufacturing and one for materials industries. In the manufacturing series, composite capacity utilization rates for primary-processing industries, advanced-processing industries, and total manufacturing are published quarterly in the Federal Reserve Board statistical release, "E.5 Capacity Utilization in Manufacturing." The total composite manufacturing rate is also published in the "Federal Reserve Bulletin." In the materials series, the Board calculated rates up to July 1976 for 15 major materials industries and published quarterly rates in the Federal Reserve Board statistical release "G.12.3 Industrial Production." The rates for both series have been calculated back to 1948.

In mid-July 1976 the Board began publishing monthly a total materials capacity utilization series. The new series expands the major materials series from 15 to 96 materials industries included in the Index of Industrial Production. Composite utilization rates are published for total materials, durable goods materials, nondurable goods materials, energy materials, and textile, paper, and chemical materials. A separate rate is provided for basic metal materials within the durable goods group, and separate rates are provided for chemical, paper, and textile materials within the nondurable goods group. The revised series, introduced in the July 16, 1976, "Industrial Production" release contains both monthly and quarterly rates. Quarterly data will also be published in the "Federal Reserve Bulletin."

The Federal Reserve Board's Board of Governors determines general monetary, credit, and operating policies for the Federal Reserve System and prepares rules and regulations necessary to carry out the purposes of the Federal Reserve Act of 1913, as amended. Its principal duties consist of exerting an influence over credit conditions and supervising the Federal Reserve and member banks.

In an effort to improve its manufacturing series, the Federal Reserve Board contracted with the Bureau of the Census to perform a capacity utilization survey and provide a benchmark for this series. For the fourth quarters of 1973

and 1974, the Census and Federal Reserve Board composite manufacturing rates were almost the same (84 percent compared to 82.6 percent for 1973 and 75 percent compared to 75.7 percent for 1974). However, Census' preliminary result for the fourth quarter of 1975 was 75 percent compared to 70.7 percent reported by the Board.

In April 1974 the Federal Reserve Board announced several steps to try to improve its major materials series. The Board added three subgroups of the chemicals industry to the series, obtained broader representation of the steel industry, modified treatment of the capacity utilization data for the petroleum refining industry, and changed its method of aggregating the capacity utilization rates. In addition, the Board began publishing data for six industrial subgroups.

The Board announced further steps to improve its capacity utilization statistics in June 1976. A member of the Board of Governors stated in a speech that data on capacity utilization rates and productive capacity were very unsatisfactory and that the Federal Reserve Board was making a strong effort to improve them. He said that the Federal Reserve Board's manufacturing rates were "far too low." The modifications to this series are expected to show a considerably higher utilization rate than the present series.

Capacity utilization estimates for the Federal Reserve Board's manufacturing series are constructed from the (1) Board's Index of Industrial Production, (2) Census' measure of the gross stock of capital goods, and (3) McGraw-Hill's capacity index and capacity utilization rates. Estimates for the major materials series were based on the Board's Index of Industrial Production and capacity data.

The Board's methodologies

The utilization rates for the manufacturing series are an estimate of production divided by an estimate of capacity.

The estimate of production for this series is obtained from the Board's Index of Industrial Production published monthly. This index is constructed by combining estimates of physical quantities of output, either measured directly or estimated from information about inputs and productivity, with weights based on the relative importance of each market or industry during the base year for the index.

APPENDIX II

The estimate of capacity used in calculating the manufacturing series is obtained from a capacity trend line constructed from (1) the perpetual inventory measure of the gross stock of capital goods obtained by Census from surveys of manufacturers, (2) the McGraw-Hill index of capacity, and (3) the Federal Reserve Board production index divided by the McGraw-Hill capacity utilization rates.

The major materials capacity utilization series is a weighted average of rates compiled separately for each of the 15 industries covered. In each instance, capacity utilization is obtained by dividing production by capacity.

The methodology for the expanded total materials series is expected to be published in a fall issue of the "Federal Reserve Bulletin."

WHARTON ECONOMETRIC FORECASTING ASSOCIATES, INC.

Wharton publishes quarterly composite capacity utilization rates for durable- and nondurable-goods industries; manufacturing; mining; manufacturing and mining; utilities; and manufacturing, mining, and utilities industries. These rates will be published in the "Wharton Magazine." Detailed rates for individual industries are available at standard fees.

The rates are prepared by Wharton Econometric Forecasting Associates, Inc., a University of Pennsylvania nonprofit organization, to provide a way of looking at the movement of economic activity and to develop a variable that is useful in econometric models. Data for the series has been calculated back to 1947.

Twenty-seven industries, including both manufacturing and nonmanufacturing industries, are covered in Wharton's series. The capacity utilization rates are based on data obtained from Government sources or trade associations.

Wharton's methodology

Capacity utilization rates are calculated by dividing the production index by an estimate of maximum production capacity for each industry determined by plotting seasonally adjusted quarterly production data and identifying peak quarters. Production at the peaks is considered to be

100 percent capacity. 1/ Capacity is assumed to grow along a straight line connecting successive peaks and all points along the line represent 100 percent capacity.

For the period after the most recent production peak, capacity is assumed to grow along the same straight line that it followed before. If production goes above the line a new peak is established and a new capacity estimate is defined.

The capacity utilization rate is calculated by dividing the actual production data by the capacity point on the trend line. If the calculation is based on a projected trend line, the rates are revised when a new peak is determined.

THE CONFERENCE BOARD, INC.

Between 1970 and 1975 the Conference Board published capacity utilization rates for durable- and nondurable-goods manufacturers and a composite rate for all manufacturers. The rates were published in the Conference Board's Manufacturing Investment Statistics series on Capital Investment Conditions.

The Conference Board is a private, nonprofit, research institute and was established in 1916. It performs various analyses of the current economic situation and outlook.

From 1965 to 1975 the Conference Board performed a semiannual survey of capital investment conditions in manufacturing. In 1970 two questions concerning industrial capacity utilization were added to the Capital Investment Conditions survey. Between 1970 and 1975 the Conference Board published its capacity utilization series semiannually. Conference Board officials said the Board stopped calculating capacity utilization rates because the statistic was not accurately showing the cyclical movements of the economy.

1/An exception to this is when Wharton determines industries are producing less than their full potential output, referred to as a "weak peak." If independent evidence indicates that a production peak is a "weak peak," Wharton does not consider the peak to represent 100 percent capacity. The maximum production capacity in this case is determined by connecting the previous peak with one subsequently determined.

The Conference Board's sample was a list of the 1,000 largest companies in terms of total assets. Seventy of the companies selected chose not to participate in the survey.

Questionnaires were mailed in January and July to the remaining 930 manufacturing companies covering various industries. The data was usually published about 2 months after the questionnaires were mailed. The response rate was about 40 to 45 percent.

The Conference Board did not define capacity in its questionnaire because it believes capacity is an elusive concept and probably cannot be standardized. Respondents were expected to define capacity in their own terms.

The Conference Board's methodology

Companies were asked to state whether their plant and equipment facilities were inadequate, sufficient, or more than adequate to meet current orders. Companies indicating "more than adequate facilities" were asked to indicate the extent of underutilization. For each response, the Conference Board assumed a percentage range of utilization as follows.

Facilities are:	Assumed rate of utilization (percent)
Inadequate	93 to 100.0
Sufficient	90 to 92.9
More than adequate, underutilized by:	
Under 10 percent	80 to 89.9
10 to 19 percent	70 to 79.9
20 and over	55 to 69.9

The midpoints of these ranges were used to weight the assets of the companies. The sum of these weighted assets was then divided by the unweighted sum of all respondents' assets to obtain the final utilization rate.

Using this methodology, it was not possible for an industrial capacity utilization rate to reach 100 percent. The highest rate possible was 96.5 percent which is the midpoint of the range for "inadequate" facilities.

BUREAU OF ECONOMIC ANALYSIS

The Bureau of Economic Analysis (BEA) conducts a quarterly company-level survey to publish statistics showing

composite rates of capacity utilization for manufacturing industries and industry groups--such as durable- and nondurable-goods industries--by asset size 1/ and utilization rates for individual industries, primary-processing industries, and advanced-processing industries. These rates are published in BEA's "Survey of Current Business."

The rates are prepared by BEA's Business Outlook Division whose main purpose is assessing the short-range economic outlook. The Division introduced its capacity utilization series in July 1974, although data for the series has been reconstructed back to 1965.

Questionnaires are sent to over 3,000 companies covering 25 industries and accounting for about 75 percent of the gross depreciable assets in 1969. The sample is essentially the same sample used by BEA for its Plant and Equipment Expenditures Survey. The sample is designed to cover large companies with assets of $100 million and over while small companies were chosen by a stratified probability 2/ sample.

BEA does not define capacity in its questionnaire for its respondents' use. However, the respondents are instructed to estimate their utilization by following "the company's usual operating practices with respect to use of production facilities, overtime, work shifts, and holidays, etc." BEA claims a response rate of about 75 to 80 percent.

BEA's methodology

Capacity utilization rates are computed by assigning each responding company to an industry according to the company's 1969 primary activity and to an asset-size class according to total assets as reported in BEA's Plant and Equipment Expenditures Survey.

A three-step procedure is then followed:

--The individual company capacity utilization rates, weighted by the company's gross depreciable assets

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1/The asset-size classes are $100.0 million and over, $10.0 million to $99.9 million, and under $10.0 million.

2/Probability sampling includes all methods of sampling in which the sampling units are selected according to the laws of chance so that the probability of being included is known (and not zero) for each member of the population.

for 1969, are combined to give estimates of industry rates by asset-size class.

--The rates for the three asset-size classes, weighted by industry gross depreciable assets for 1969, are combined into industry rates.

--The industry rates, weighted by an estimate of 1969 manufacturing capacity for the industry, are combined to give rates for groups of industries.

BUREAU OF THE CENSUS

The Bureau of the Census annually surveys a sample of industrial plants. From this information Census calculates and publishes a composite rate of capacity utilization for manufacturing industries; composite rates for durable goods, nondurable goods, primary-processing, and advanced processing industries; and rates for individual industries. These rates are published in Census' report entitled "Survey of Plant Capacity."

The rates are prepared by Census' Industry Division whose main objective is to measure the activities of the manufacturing and mining segments of the economy to serve the informational needs of Government, industry, and the general public.

Census performed a capacity utilization survey on a pilot basis as a result of a November 1971 request from the Chairman of the Federal Reserve Board. The Chairman wanted Census' help in improving the Board's quarterly estimates of capacity utilization. The purposes of this pilot survey were to (1) test the feasibility of devising a reasonable definition of capacity and (2) determine the willingness of manufacturers to make responsible estimates of the capacity utilization for individual plants according to a given definition.

The pilot survey, requesting information for the fourt quarter of calendar year 1971, covered 1,000 plants. The survey was not designed to provide reliable estimates of capacity utilization because of the small sample and the sample design.

Based on the responses to the pilot survey, Census concluded that (1) the use of a definition of capacity was feasible for later surveys and (2) estimates of capacity and capacity utilization could be obtained for individual plants.

Census conducted a second survey for the Federal Reserve Board in August 1974. Survey questionnaires, requesting information on capacity utilization for the fourth quarter of 1973, were mailed to approximately 4,000 plants selected by a probability sample. This sample was drawn from the sample of about 70,000 plants used by Census for its Annual Survey of Manufactures. All but four major industry groups and a subgroup of a fifth industry were represented in the sample. These groups were excluded because of the industries' problems in estimating capacity. Census requested that the respondents use the following definitions of capacity--practical capacity is the greatest level of output a plant can achieve within the framework of a realistic work pattern and the preferred level of operations (preferred capacity) is the level of operations which the plant would prefer not to exceed because of costs or other considerations.

Census claimed a response rate for this survey of 69 percent. Generally, those plants that did not respond were small and/or insolvent. Census published the results of this survey in October 1975.

In March 1975 Census performed its own survey of capacity utilization to obtain information for the fourth quarter of 1974. Census used the same definitions of capacity that were used for the surveys performed for the Federal Reserve Board. Census selected a probability sample of about 9,200 plants, generally covering all manufacturing industries, from the plants covered by its Annual Survey of Manufactures. Plants with 2,000 or more employees were automatically chosen while plants with less than 2,000 employees were randomly selected. Census mailed the questionnaires to the plants in March 1975. Census claimed that 62 percent of the plants responded. The results of this survey were published in April 1976.

Because Census considered the response rate on the 1974 survey to be unsatisfactory as a basis for developing reliable estimates of capacity utilization, the survey to obtain information on the fourth quarter of 1975 was changed from voluntary to mandatory. According to Census, the response rate rose to almost 95 percent. Census issued a press release reporting preliminary capacity utilization estimates for the 1975 survey on August 12, 1976. The final report is to be issued in the fall of 1976.

Census' methodology

Using Census' definitions of capacity, respondents are asked to provide information, within established percentage

ranges, on (1) their actual operations as a percent of their preferred rate of operations and as a percent of their practical capacity during the fourth quarter of the survey year and (2) their operations in the fourth quarter of the prior year as a percent of their practical capacity at that time.

Census weights the rates obtained from individual plant responses by the plant's employment and averages the weighted rates to determine capacity utilization rates for the individual industries. Composite rates for durable goods, nondurable goods, primary processing, advanced processing, and all manufacturing industries are computed as averages of the employment-weighted utilization rates of all the individual establishments included in the particular composite total.

RINFRET-BOSTON ASSOCIATES, INC.

Rinfret-Boston conducts quarterly surveys of capacity utilization and publishes rates for individual industries, durable- and nondurable-goods manufacturers, manufacturing industries, nonmanufacturing industries, and all industries. These rates are published in Rinfret-Boston's Capital Investment Surveys series.

Rinfret-Boston is an international economics and financial consulting firm. Rinfret-Boston performs various industrial surveys to provide its clients with information concerning the current and future conditions of the United States economy.

In the fall of 1972, Pierre Rinfret, president of Rinfret-Boston, became dissatisfied with the Federal Government capacity utilization estimates. At that time, several industrialists told him they were running out of practical capacity; however, the Federal Reserve Board was reporting that industry still had about 18-percent unused capacity. Through 1974 growing numbers of manufacturers reported capacity shortages but the Board still reported about 20-percent unused capacity. As a result, Rinfret-Boston decided to do its own capacity utilization survey.

Rinfret-Boston's first capacity utilization survey was performed in the fall of 1974. Manufacturers responding to Rinfret-Boston's survey indicated that, as of September 1974, they were operating at about 91 percent of capacity. Another survey was conducted from mid-January to mid-February 1975. At that time, manufacturers reported that they were operating at 87 percent of capacity. Rinfret-Boston began conducting quarterly capacity utilization surveys in April 1975.

Rinfret-Boston selected a stratified sample of companies representing various industrial sectors, manufacturing and nonmanufacturing. We could not obtain the size of the sample because it is Rinfret-Boston's policy not to reveal this information. Rinfret-Boston claims that its response rate averaged about 45 percent.

Rinfret-Boston does not define capacity for its respondents (except for those in the transportation and utilities industries) because it believes (1) there is no clear accepted definition of capacity and (2) a forced definition may lead to inaccurate data because capacity varies from sector to sector and industry to industry. Most companies are asked to calculate their capacities based on their own understanding of capacity. Companies in the transportation and utilities industries are provided definitions which are standard for their respective industries.

Rinfret-Boston's methodology

Rinfret-Boston calculates its capacity utilization rates using its survey respondents' assets as a weighting factor. The assets of the companies for 1974 are totaled by industry. Each company's assets are taken as a percentage of that total. This percentage is then multiplied by the capacity utilization rate reported by the company to obtain the weighted capacity utilization rate for the company.

The weighted rates for all companies in an industry are added to obtain the capacity utilization rate for the industry. Then the industry rates are averaged to get a composite total capacity utilization rate.

AN EVALUATION OF CAPACITY UTILIZATION STATISTICS

Based on discussions with users and preparers of the capacity utilization statistics and articles written about the series, we identified several characteristics which we used to evaluate the capacity utilization statistics. We divided the characteristics into two categories--those applicable to all series and those applicable to series involving direct surveys of businesses.

The characteristics applicable to all of the capacity utilization series relate to definition of terms used in publications, calculation frequency, adjustments for seasonal changes, data accuracy, and publication timeliness. The characteristics applicable to series based on direct surveys relate to sampling method, sample coverage, sample size, survey level, definition of questionnaire terms, and response rate. They are described in detail in appendix IV.

STRENGTHS AND WEAKNESSES OF THE SERIES

We found that all of the series have both strengths and weaknesses. Following is our detailed evaluation of the statistics prepared by the seven organizations. A comparison of the capacity utilization series is shown in appendix V.

The McGraw-Hill series

Strengths of the McGraw-Hill series include calculation frequency, adjustments for seasonal changes, publication timeliness, and sample size.

Based on data obtained from an annual survey, McGraw-Hill calculates monthly capacity utilization rates. According to a McGraw-Hill official they began calculating the monthly rates to prepare a more timely series.

McGraw-Hill uses seasonally-adjusted production data from the Federal Reserve Board's Index of Industrial Production in calculating its monthly rates. Any changes in McGraw-Hill's rates should therefore be caused by nonseasonal factors.

McGraw-Hill normally publishes its composite monthly utilization rate for manufacturing industries in its "Business Week" magazine during the month immediately following the month to which the data applies. More detailed data is sold to users by subscription.

McGraw-Hill's sample for obtaining capacity and investment data currently includes about 1,800 companies, making it the second largest company sample. The sample covers companies in the manufacturing, mining, and utilities industries.

Weaknesses in McGraw-Hill's series are the definition of terms used in publications, sampling method, sample coverage, survey level, data accuracy, definition of questionnaire terms, and response rate.

McGraw-Hill publishes its capacity utilization rates in its annual publication on businesses' plans for new plants and equipment. However, a user cannot identify the industries covered by the rates because the industries included in the "Other Durables" and "Other Non-Durables" groups of industries are not identified. McGraw-Hill also does not identify for potential users which industries are covered by the composite manufacturing rate published in "Business Week."

McGraw-Hill's sample of about 1,800 companies was not selected according to probability theory. A McGraw-Hill official advised us that their sample is biased to large firms but they have attempted to improve the sample by adding small firms. Though the sample includes companies in the manufacturing, mining, and utilities industries, several manufacturing industries are not accounted for. Therefore we cannot determine whether and to what extent certain industries are covered. Selection biases have not been minimized.

McGraw-Hill uses a company-level survey to obtain information for calculating individual industry rates and certain composite rates. A company response generally would cover a company's plants and lines of activity. The response is classified by industry according to its primary activity. Consequently, for diversified companies whose activities cross industry classifications, the major secondary lines of activity are misclassified distorting the rates calculated for the individual industries.

The accuracy of McGraw-Hill's data is questionable for several reasons. First, McGraw-Hill's statistics for individual industries may be distorted because secondary lines of activity are misclassified because of the level at which the survey was performed. Second, a McGraw-Hill official said, if the company data does not seem reasonable, they would check with the company. No other checks are performed on the data to test its accuracy. Third, the biases resulting from the sample selection method will distort the

statistics. This is particularly true of the large-firm bias which normally will cause higher utilization rates than would result from a representative sample. A McGraw-Hill official told us that the level of their rates may not be exactly correct and that he prefers to use the information as a trend indicator.

McGraw-Hill does not define capacity in its questionnaire because it believes the definition will vary between companies and industries.

McGraw-Hill claims a response rate of 56 percent. This rate is somewhat lower than the Census and Bureau of Economic Analysis rates and slightly higher than the Rinfret-Boston and Conference Board rates.

The Federal Reserve Board series

The strengths of the manufacturing series are the definition of terms used in publications, calculation frequency, adjustments for seasonal changes, and publication timeliness. The major materials series had the same strengths.

The Federal Reserve Board publishes its composite capacity utilization rate for manufacturing in the "Federal Reserve Bulletin." Composite rates for manufacturing, primary-processing, and advanced-processing industries are published in a statistical release on capacity utilization in manufacturing. References are provided in the statistical release to a published description of the series which identifies the industries included in the respective groupings. Similar references were provided in a statistical release on the major materials series. A description of the methodology of the new total materials series is expected to be published in a fall issue of the "Federal Reserve Bulletin."

The manufacturing series is prepared quarterly and the new total materials series is published monthly. The frequencies are better than the less frequently calculated series in showing the short-term fluctuations in capacity utilization for the [illegible]ries covered.

The Federal Reserve Board seasonally adjusts its capacity utilization data for both the manufacturing and major materials series. The new total materials series is also seasonally adjusted. Therefore changes in the rates are caused by nonseasonal factors.

The overall manufacturing series has generally been published and released to the public within 20 days after the end of the quarter. This series is one of the more

timely series published and is listed as a principal Federal economic indicator.

The weakness of the manufacturing series relates to the accuracy of the series. The Federal Reserve Board uses McGraw-Hill's capacity utilization series in calculating its manufacturing series. Consequently, the Board's manufacturing series is affected by the weaknesses of the McGraw-Hill series. These weaknesses include the sample selection resulting in a large firm bias and potential misclassifications of industry data resulting from a company-level survey. According to a present Board staff official, a former staff official was trying to revise the Board's manufacturing series and replace the McGraw-Hill data because there were errors in the data.

Another staff official stated in a "Federal Reserve Bulletin" article published in November 1968 that the Board's quarterly estimates of manufacturing capacity and capacity utilization were probably subject to much larger measurement errors than most commonly used statistical series because of deficiencies in coverage, detail, and accuracy of the underlying data; and the indirect nature of constructing the capacity estimates.

The Board is presently taking steps to try to improve its capacity utilization series.

The Wharton series

Strengths of the Wharton series are the calculation frequency, adjustments for seasonal changes, and publication timeliness.

Wharton calculates its series quarterly. This frequency is better than the less frequently calculated series in showing the short-term fluctuations in capacity utilization for the different industries.

Wharton uses seasonally adjusted production data from the Federal Reserve Board's Index of Industrial Production in calculating its quarterly rates. Therefore rate changes are caused by nonseasonal factors.

The composite capacity utilization rates calculated by Wharton will be published in the new "Wharton Magazine." However, the detailed rates are made available to subscribers within a few days after Wharton receives the production index data from the Federal Reserve Board.

The weaknesses of the Wharton series include definition of terms used in publications and the accuracy of the data.

Wharton published composite rates in its quarterly newsletter. The publication did not identify the industries included in its industry groups. In the future, the rates will be published in the "Wharton Magazine."

The main controversy surrounding the Wharton series is the concept of capacity, which affects the accuracy of the series. Wharton's concept of capacity equates maximum capacity with the level of production represented by a trend line formed by connecting successive production peaks. For any particular date, the point on the trend line connecting two peaks is equal to 100-percent capacity. The part of the trend line that extends beyond the most recent production peak represents a projection of maximum capacity until the next production peak is reached. The trend line is then redrawn connecting the two peaks and the final capacity utilization rates are determined.

The Wharton method results in an understatement of maximum capacity and an overstatement of the capacity utilization rates. Maximum capacity is understated because capacity is considered to be the actual production achieved rather than the maximum production which could be achieved through the use of the facilities and equipment. The understatement of maximum capacity will result in the overstatement of capacity utilization when production is compared to capacity.

The Conference Board series

Strengths of the Conference Board capacity utilization series include the level of the survey and the timeliness in publishing the data.

The Conference Board conducted a semiannual survey of companies and calculated capacity utilization rates for the durable-goods and nondurable-goods industries and a composite rate for all manufacturers. Because of this generalized level of detail, we believe the company-level survey was appropriate as opposed to performing the more expensive plant-level survey.

The statistics were also compiled and published in a timely manner. The Conference Board collected its information in about 6 weeks and tabulated the data in about 2 weeks for release soon thereafter.

The Conference Board's series had several weaknesses. These relate to definition of terms used in publications, calculation frequency, adjustments for seasonal changes, data accuracy, sampling method, sample coverage, definition of questionnaire terms, sample size, and response rate.

For the most part, the Board defined terms including industry groupings used in its publication. However, the industries included in the "Nondurables" and "Other Durables" groupings were not identified in the Conference Board's publication.

The Conference Board published its statistics semiannually. A Board official suggested that the statistics be viewed as a trend indicator. Although better than an annual frequency, this semiannual frequency will not show the short-term fluctuations in the capacity utilization of the manufacturing industries as are shown by the more frequently calculated series.

The Board did not seasonally adjust the utilization rates calculated for normal seasonal factors. The changes in the rates were therefore caused by both normal seasonal and nonseasonal factors.

Three problems affected the accuracy of the series. The Conference Board made no routine check of the accuracy of the data received from the responding companies. However, it did attempt to work out any inconsistencies in the data with the companies and eliminated responses from the tabulation process when it questioned the accuracy of the data.

The selection of the largest firms caused a large-firm bias and higher utilization rates than would have resulted from a sample representative of the manufacturing industries.

In addition, the companies responded subjectively stating whether their plant and equipment was inadequate, sufficient, or more than adequate rather than providing specific percentages for their capacity utilization. The Conference Board assumed that each company's response would fall within a particular percentage range depending upon the company's subjective response. The midpoints of the ranges were then used to calculate the utilization rates. This procedure limited the degree of precision of the statistics.

The Conference Board selected 930 manufacturing companies listed as the largest companies in terms of total assets. The companies were not selected to be representative of all manufacturing companies. Because the largest companies were selected, the sample had both large-firm bias and industry bias. The large-firm bias would result in the statistics showing higher utilization rates than a series not affected by the bias because large firms have historically reported higher utilization rates than have smaller firms.

The sample also had industry bias because some industries were more heavily represented than others. For example,

textile companies were underrepresented and petroleum companies were overrepresented in the sample. The Conference Board representatives agreed that their series had these biases.

The Conference Board did not define capacity in its questionnaire used to obtain information from the companies surveyed because it believed the concept probably could not be standardized. The Board relied on the respondents to use their judgment in defining capacity.

The 930 companies selected represented one of the smaller samples used in compiling capacity utilization statistics. In addition, the response rate (40 to 45 percent) was among the lowest of any of the capacity utilization surveys.

The Bureau of Economic Analysis series

The BEA series' strengths include definition of terms used in publications, calculation frequency, adjustments for seasonal changes, sampling method, sample coverage, sample size, and response rate.

References are provided in BEA's "Survey of Current Business" to a published description of the series which identifies the industries included in different aggregated groups.

BEA surveys companies and calculates its capacity utilization rates quarterly. Although the monthly McGraw-Hill series (calculated from an annual survey) shows monthly fluctuations in the utilization rates, the quarterly frequency is the best frequency that any of the five preparers achieved with a direct survey. The BEA series should record the frequent short-term fluctuations in capacity utilization.

In addition, BEA seasonally adjusts its data to eliminate the effect of normal seasonal factors on the movement of the rates. The seasonally adjusted rates would therefore show changes in the rates caused by other than normally recurring seasonal factors.

BEA samples over 3,000 companies in its capacity utilization survey. BEA's sample size is one of the largest (if not the largest) of the company-level surveys used to prepare capacity utilization statistics.

The sample is designed to cover large companies with assets of $100 million and over with certainty and smaller companies were selected based on probability theory. This

manner of sample selection should help to minimize the selection biases and the sampling method would be a strength of the series.

BEA's sample generally covers the manufacturing industries but does not include nonmanufacturing industries. BEA's series is unique because BEA publishes composite utilization rates stratified by company size for the overall manufacturing level and for the durable- and nondurable-goods industries.

The 75- to 80-percent response rate claimed by BEA is a good return rate.

Weaknesses in BEA's series include publication timeliness, level of the survey, data accuracy, and definition of questionnaire terms.

BEA has been publishing its capacity utilization rates during the third month following the period to which the data applies. This kind of delay in publication reduces the statistics' value as a current economic indicator.

BEA calculates capacity utilization rates for individual industries, such as primary metals, electrical machinery, textiles, and petroleum, and composite rates for durable goods, nondurable goods, and all manufacturers. BEA surveys companies to acquire its data and assigns each company's response to an industry based on the company's primary activity. Since a company-level survey normally includes all lines of activity (including those crossing industry lines), this survey level can cause industry rates to be misstated because prominent secondary activities of the companies are misclassified.

The main problem relating to data accuracy concerns the potential misstatement of the industry rates because of performing a company-level rather than a plant-level survey. In addition, BEA's quality control procedure to assure data accuracy is generally limited to identifying any company's response which looks "out-of-line." For any company so identified, BEA will telephone the company to try to obtain usable information.

BEA does not define capacity in its questionnaire used to collect information from the companies. It requests that the companies estimate their utilization based on their usual operating practices such as the use of productive facilities and work shifts.

The Census series

Strengths of the Census series include definition of terms used in publications, data accuracy, sampling method, sample coverage, sample size, survey level, and response rate. Although the capacity definitions given to the respondents are a strength of the series, the same definitions for all industries seems to be unworkable.

Census defined its terms, including the industries covered by its survey, in its publication.

Census' methodology and sample characteristics are good and should result in reasonably accurate information for the manufacturing industries. However, in its published results for the survey of the fourth quarter of 1973, Census recognized that it was extremely difficult to translate the concept of plant capacity into a working definition which was applicable to all industries. Because of the definitional and conceptual problems associated with the survey, Census concluded that it was likely that the response errors were greater in magnitude than for some other manufacturing surveys.

The survey sample for the fourth quarter of 1973 covered all but four major manufacturing industry groups and a subgroup of a fifth industry. These were excluded by Census because of the industries' problems in estimating capacity. However, Census included these groups in its 1974 survey resulting in coverage for the major manufacturing industries. The Census survey excluded nonmanufacturing industries as do some other capacity utilization surveys.

Census selected a sample of about 9,200 plants from a probability sample of about 70,000 plants used in its Annual Survey of Manufactures. Plants having 2,000 or more employees were automatically selected and plants with less than 2,000 employees were selected in accordance with probability theory. This selection process will help to minimize the biases of selection. Census also has more reporting units than most, if not all, of the other utilization surveys. Rinfret-Boston's sample size is unknown.

Based on the detail of the statistics which Census calculates and publishes, the plant-level survey is better than a company-level survey for calculating industry rates to reduce errors in assigning responses to industry classifications. Census assigns the responses to an industry based on each plant's primary activity according to the 1972 Standard Industrial Classification manual.

In an attempt to get consistency in the responses, Census provided its respondents with definitions of capacity. As previously discussed, Census has experienced some problems with its definitions. Two preparers consider the definitions not applicable to all sectors and industries covered by Census' survey.

The 69- and 62-percent response rates for the 1973 and 1974 surveys are good returns for voluntary surveys. Census made its survey mandatory in 1975 and the response rate rose to almost 95 percent.

Weaknesses in Census' capacity utilization series relate to the calculation frequency and publication timeliness.

The Census survey is conducted annually. This frequency is not often enough to show the frequent short-term fluctuations in the capacity utilization of the manufacturing industries.

The results for Census' survey of capacity utilization for the fourth quarter of 1973 were published in October 1975. The results for the fourth quarter of 1974 were published in April 1976. Preliminary results for the fourth quarter of 1975 were issued in a press release on August 12, 1976. Officials estimate that, in the future, the data should be available 5 to 7 months after the end of the period covered.

The Rinfret-Boston series

The Rinfret-Boston series' strengths include calculation frequency and publication timeliness.

Rinfret-Boston conducted its first capacity utilization survey in the fall of 1974. A second survey was performed in mid-January to mid-February 1975. In April 1975 Rinfret-Boston began conducting surveys quarterly which is the best frequency achieved by any of the organizations using a direct survey to collect its information. The series should record the frequent short-term fluctuations in capacity utilization.

The results of the first two surveys were published in the first month after the survey. The series, therefore, is one of the more timely series published.

Weaknesses in the Rinfret-Boston series include definition of terms used in publications, adjustments for seasonal changes, sampling method, sample coverage, survey level, data accuracy, definition of questionnaire terms, and response rate.

Rinfret-Boston publishes detailed rates in its publication but does not identify the industries included in the "Other Durable Goods" and "Other Nondurable Goods" industry groups. Therefore, potential users will not know which industries are covered by the series.

Rinfret-Boston does not seasonally adjust its statistics because they do not have a long enough history to determine what seasonal adjustments should be made. Consequently, the changes in the rates would be caused by both seasonal and nonseasonal factors.

A Rinfret-Boston official advised us that their sample was a stratified sample of companies in all asset ranges but concentrated on companies having assets exceeding $200 million. According to this official, sampling a representative number of smaller firms would make the cost of the survey prohibitive. Rinfret-Boston declined to divulge the size of its sample because of company policy. Based on our analysis, the sample appears to provide at least some coverage of most of the major industries, manufacturing as well as nonmanufacturing. However, according to the official, the smaller firms are not well represented in the sample.

A company-level survey is used by Rinfret-Boston to calculate individual industry rates as well as various composite rates. The questionnaire instructions request that the companies provide information on the domestic operations of the companies' principal product lines. If the companies respond to the questionnaire based solely on their principal products, it may partially offset the problems of misclassification when working with company responses. A Rinfret-Boston official told us a more accurate picture of capacity utilization could be obtained through a plant-level survey but the cost of such a survey was prohibitive.

The accuracy of the series is limited to a certain extent because company-level data rather than plant-level data is obtained. The sample size and coverage may also place limitations on the series' precision. In addition, a Rinfret-Boston official told us they do not routinely check the accuracy of the data obtained from the companies. Should the response look questionable, however, they sometimes will check with the company.

Rinfret-Boston does not define capacity in its questionnaire used to collect information from most companies because it believes capacity varies between industries and there is no clear accepted definition of capacity. Standard definitions are provided for companies in the transportation and utilities industries.

APPENDIX III

For the first two surveys, Rinfret-Boston obtained responses from 40 to 45 percent of the companies in the sample. This rate is among the lowest of any of the capacity utilization surveys.

CHARACTERISTICS USED TO EVALUATE THE CAPACITY UTILIZATION STATISTICAL SERIES

Based on discussions with users and preparers of the capacity utilization statistics and also articles written about these statistics, we identified several characteristics to evaluate the statistical series. The characteristics are general in nature and can be used in evaluating the adequacy of other statistical series.

For discussion purposes we divided the characteristics into two categories--those applicable to all series regardless of the sources of information used in calculating the series, and those applicable to series involving direct surveys of respondents. Although the direct survey characteristics might not seem to apply to a statistical series using secondary information to calculate the capacity utilization rates, these characteristics would generally apply because of the initial source of the secondary information. The secondary information used in calculating the capacity utilization series can often be traced back to surveys of businesses as the initial source for the information. However, we did not evaluate the validity of the secondary information being used to calculate the capacity utilization series.

APPLICABLE TO ALL SERIES

The characteristics applicable to all of the statistical series relate to definition of terms used in publications, calculation frequency, adjustments for seasonal changes, data accuracy, and publication timeliness.

Definition of terms used in publications

The preparers should identify, in their publications, any terms which may lead to variations of interpretations by potential users. Terminology as well as the composition of the statistics should be clearly identified to preclude misinterpretation and misuse of the data.

Calculation fregency

The frequency of calculating a series relates to the period of time that lapses between each calculation of the statistic. The purpose of a statistical series is to mea-

sure and identify changes in activities. The trend lines formed by the statistics should accurately record these changes. The more frequently calculated series will identify short-term changes whereas the less frequently calculated series will identify only long-term changes.

Adjustments for seasonal changes

Changes in the data being measured may result from seasonal factors. The factors include such things as climate conditions, production cycles, model changes, holidays, and sales. Adjustments to the data for seasonal factors should eliminate the effect of changes that normally occur at the same time and in about the same magnitude each year.

Data accuracy

The utilization rates calculated can be only as good as the quality of the data and procedures followed in making the calculations. Quality control procedures should be included in the plans for the statistical series to (1) test the reliability of the data obtained and (2) insure the accuracy of the calculations. These procedures are needed to insure the publication of accurate data.

Publication timeliness

Statistics should be prepared and ready for issuance without unnecessary delay. The shortest interval practical should exist between the date or period to which the data refer and the date when compilation and publication is completed. Otherwise the usefulness of the statistics for decisionmaking may be limited.

The Office of Management and Budget has established a goal of compiling and releasing principal statistical indicators within 20 working days. In the case of other series, the Office says that more time can be allowed, but every effort should be made to keep the time to a minimum. However, delays in publishing these series will result in the statistics no longer reflecting the current conditions and therefore the usefulness of the statistics in making decisions will be diminished.

We established a cutoff point of 2 months after the period to which the data relate in evaluating the timeliness of the seven preparers in publishing their capacity utilization series. The cutoff is essentially twice the amount of

time established by the Office for compiling and releasing the principal statistical indicators. If the statistics were released within the 2 months, we considered publication timeliness a strength of the series. If the statistics were not published within 2 months, we concluded that the statistics were not published in a timely manner. Publication timeliness was therefore a weakness of the series.

APPLICABLE TO DIRECT SURVEY SERIES

The characteristics applicable to statistics based on direct surveys of respondents relate to sampling method, sample coverage, sample size, survey level, definition of questionnaire terms, and response rate.

Sampling method

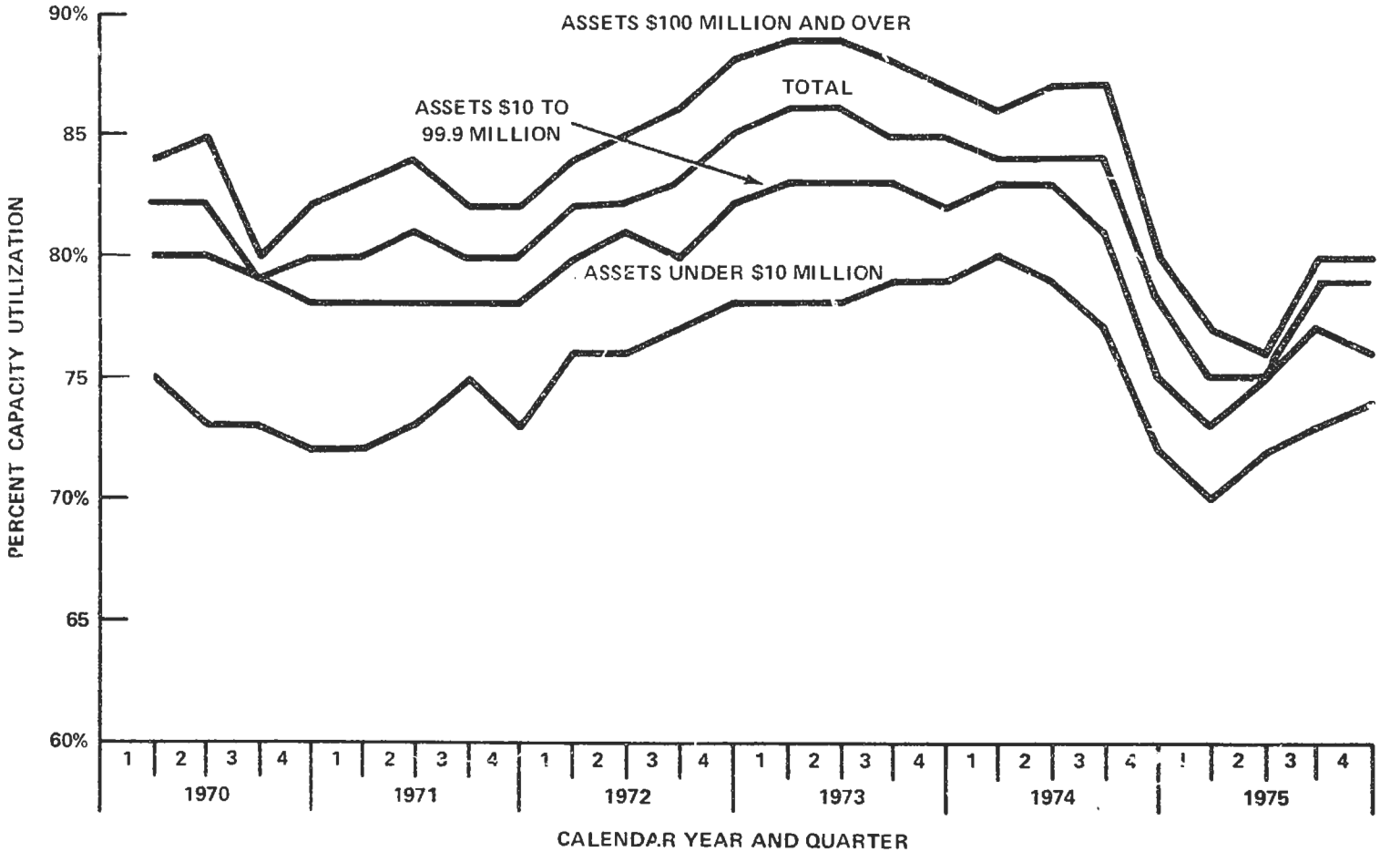
The sampling method relates to how the sample is selected. The sample should be selected in a manner which will assure that the individual companies or plants selected will be representative of the universe. Where there is potential for unknown biases of selection, the sample should be selected in accordance with probability theory to avoid biases of selection and permit the preparer to calculate estimates for the universe with a measurable degree of reliability.

Sample coverage

The sample coverage relates to whether all types of units in the universe being measured are represented in the sample. A nonrepresentative sample can cause certain biases--such as large-firm bias and industry bias--in the final product.

Large-firm bias occurs when the final product is influenced more by the capacity utilization rates of large firms than would occur with a representative sample. The Bureau of Economic Analysis' series, shown on the graph on the following page, identifies the capacity utilization rates for companies falling within three different asset-size groups. As shown on the graph, the utilization rates for the largest companies for the years 1970 through 1975 were higher than the overall rate. This indicates that a series which is affected by large-firm bias would show higher utilization rates than a series not affected by this bias. According to the Secretary of Commerce, large companies have historically reported higher utilization rates than small companies.

BUREAU OF ECONOMIC ANALYSIS RATES
FOR TOTAL MANUFACTURING
AND THREE ASSET SIZES
1970 THROUGH 1975



APPENDIX IV

Industry bias occurs when certain industries are over-represented or underrepresented in the sample. This bias can affect the calculation of both individual industry rates and rates for groups of industries.

The rates calculated may be overstated or understated if the units in the sample are not representative of the universe being measured.

Sample size

The sample should be of an adequate size. Factors which affect the sample size include the size of the universe and the amount of detail and degree of precision desired. Limits on the sample size may result in biases--such as industry bias--in the statistics.

Survey level

The level of the survey relates to the organizational level of the units included in the sample. In the case of the capacity utilization series, five of the preparers of the series request information directly from either plants or companies to calculate their statistics. A plant is normally engaged in one line of manufacturing. A company generally would include more than one plant and line of activity which, depending on the degree of diversification, may cross industry classifications.

The decision as to the level at which a survey should be made, however, is based on the degree of detail of capacity utilization statistics which the preparer calculates. We believe a plant-level survey should be conducted if a preparer calculates individual industry rates. This will allow the plant's response to be properly classified by industry according to its activity since it is generally engaged in a single activity. The preparers of the statistics classify a company's response by its primary activity. Consequently, major secondary and tertiary lines of activity are misclassified for diversified companies whose activities cross industry classifications. These improper classifications can lead to overstatement or understatement of the industry utilization rates.

Definition of questionnaire terms

The preparers should define in their survey questionnaires any terms which may lead to variations of interpreta-

tion by the respondents. Otherwise, the respondents will use their own judgments about the meaning of these terms and comparable data may not be obtained. Most preparers do not provide a definition of capacity to the respondents.

Response rate

The percentage of units in the sample which provide useable information to the surveying organization is called the response rate. The response rate will affect the reliability of the series. Generally, the higher the response rate, the greater the degree of reliability. A low response rate may lead to large-firm bias because the larger firms have more resources to respond to such surveys than smaller ones.

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APPENDIX V

COMPARISON OF INDUSTRIAL CAPACITY UTILIZATION STATISTICAL SERIES

CATEGORY	McGRAW-HILL PUBLICATIONS COMPANY	THE FEDERAL RESERVE BOARD (Manufacturing)	THE FEDERAL RESERVE BOARD (Materials)	WHARTON ECONOMETRIC FORECASTING ASSOCIATES, INC.	THE CONFERENCE BOARD, INC.	BUREAU OF ECONOMIC ANALYSIS	BUREAU OF THE CENSUS	WHARTON-ROSTOW ASSOCIATES, INC.
Publication Media	Business Week magazine; detailed data sold by subscription; Annual survey report on businesses' investment plans	Federal Reserve Bulletin; Capacity Utilization in Manufacturing (Statistical Release G.3)	Industrial Production (Statistical Release G.12.3)	Wharton Magazine; detailed industry rates sold at standard fees	Manufacturing Investment Statistics Series on Capital Investment Conditions	Survey of Current Business	Current Industrial Reports Series on Survey of Plant Capacity	Capital Investment Surveys Series
Frequency of Coverage	Annually 1955 to present, monthly beginning October 1964	Quarterly, from 1948	Quarterly, from 1948 to 1975; monthly beginning July 1976	Quarterly, from 1947	Semiannually, 1970 to 1975	Yearend 1965, semi-annually 1966 and 1967, quarterly thereafter	Annually, starting 1973	September 1974, January 1975, quarterly beginning April 1975.
Industries Covered	About 1,800 companies in 21 manufacturing, utility, and mining industries	Various manufacturing industries	96 materials industries	37 manufacturing, utility, and mining industries	430 companies in various manufacturing industries.	Over 3,000 companies in 25 manufacturing industries	About 9,200 plants in the manufacturing industries	Selected companies representing manufacturing, utility, mining, and other industries.
Rates Published	Composite rate for manufacturing industries, rates for mining industries and utilities, and rates for individual industries.	Rates for primary processing industries, advanced processing industries, and total manufacturing.	Composite rates for total materials; durable goods; nondurable goods; energy materials; and textile, paper, and chemical materials. Separate rates for basic metal materials, chemicals, paper, and textiles.	Rates for individual industries; composite rates for durable and nondurable goods industries; manufacturing; mining; manufacturing and mining; utilities; and manufacturing, mining, and utilities industries.	Composite rate for all manufacturing and rates for durable and nondurable goods manufactures.	Composite rates for manufacturing industries, and certain industry groups by asset size and rates for individual industries and primary and advanced processing industries.	Composite rates for manufacturing, durable goods, nondurable goods, primary processin , and advanced processing industries; rates for individual industries.	Rates for individual industries, durable and nondurable goods, manufacturing industries, nonmanufacturing industries, and all industries.
Methodology	Prorates capacity increases reported by respondents in annual survey. Calculates change in capacity and change in production index. Divides production index change by capacity change to determine change in utilization rate. Previous month's utilization rate is adjusted by amount of change.	Rates are obtained by dividing production by estimates for capacity.	New methodology to be published in a fall issue of the Federal Reserve Bulletin	Rates for industries are computed by plotting seasonally adjusted quarterly production index for each industry to determine peak quarters of output. Capacity utilization is calculated by dividing the production index for the period by the capacity point on the trend line.	Respondents stated whether their plant and equipment facilities were sufficient, inadequate, or more than adequate. For each response, a percentage range of utilization was assumed. Midpoints of these ranges were used to weight the assets of the companies. The totals of these weighted assets were then divided by the unweighted total of all respondents' assets.	Companies are assigned to an industry and to an asset size class. Individual company rates are combined to get industry rates by asset size. Asset size class rates are combined into industry rates. Industry rates combined to give rates for groups of industries. Rates are weighted at each level of aggregation.	Operating rates at preferred and practical capacity are calculated by weighting the plants' responses by their employment, adding the responses for each industry, and dividing the total by the number of respondents. The composite rates are the average of the plants' employment-weighted utilization rates included in the particular composite total.	Assets of respondents are totaled by industry and each company's assets are taken as a percentage of that total. Percentage is then multiplied by rate of capacity utilization reported by company. Resulting weighted capacity utilization rates for the companies are added to obtain the utilization rate for the industry. Industry totals are averaged to get composite totals.

APPENDIX V

COMPARISON OF INDUSTRIAL CAPACITY UTILIZATION STATISTICAL SERIES

CATEGORY	McGRAW-HILL PUBLICATIONS COMPANY	THE FEDERAL RESERVE BOARD (Manufacturing)	THE FEDERAL RESERVE BOARD (Materials)	WHARTON ECONOMETRIC FORECASTING ASSOCIATES, INC.	THE CONFERENCE BOARD, INC.	BUREAU OF ECONOMIC ANALYSIS	BUREAU OF THE CENSUS	[illegible]
Major Strengths	--Calculates monthly utilization rates --Uses seasonally adjusted data --Data published in succeeding month --Sample of 1,800 companies	--Define terms used in publication --Rates calculated quarterly showing short-term fluctuations --Seasonally adjusted production data is used in calculating the rates --Data published in timely manner	--Defined terms used in publication for major materials series. Total materials description not yet published --Rates calculated monthly showing short-term fluctuations --Seasonally adjusted production data was used in calculating the major materials rates.	--Rates calculated quarterly showing short-term fluctuations --Uses seasonally adjusted data --Detailed rates available to subscribers within a few days after production index data is received.	--Company level survey --Survey results calculated in approximately 2 weeks	--Define terms used in publication --Series calculated quarterly showing short-term fluctuations --Data seasonally adjusted --Large companies selected automatically and small companies chosen by probability techniques minimizing biases --Broad survey coverage --Sample of over 1,000 companies --Claimed response rate of 75 to 80 percent	--Define terms used in publication --Data accuracy --Statistically valid sampling method --Sample generally covers major manufacturing industries --Sample of 9,200 plants --Survey conducted at plant level --Definition of capacity given to survey respondents --Claimed 67, 62, and 95 percent response rates for 1973, 1974, and 1975 surveys, respectively	--[illegible] quarterly showing short-term fluctuations --Survey results published in first month after the survey
Major Weaknesses	--Some terms are not defined in publication --Series contains problems affecting data accuracy --Sample selected without benefit of probability selection --Uncertain coverage of manufacturing industries and has large firm bias --Company level survey --Capacity not defined for respondents --Claimed survey response rate of 56 percent	--Series based on McGraw-Hill's capacity utilization rates and therefore shares some of the same weaknesses affecting data accuracy		--Terms are not defined in publication --Concept of capacity used results in overstatement of the utilization rates and understatement of the estimates of available capacity	--Some but not all terms were defined in publication --Semiannual frequency would not show short-term fluctuations --Data was not seasonally adjusted --Procedure limited degree of precision --Survey sample selection was not statistically representative --Certain industries were overrepresented and others underrepresented; large firm bias --Respondents were not given a definition of capacity --Small sample --Low response rate	--Company response classified by primary activity could lead to misclassification of prominent secondary activities --Delayed publication of results diminishes value as a current economic indicator --Company level survey to calculate individual industry rates --Definition of capacity not given to respondents	--Survey conducted annually --Delayed publication of results	--Some terms are not defined in publication --No seasonal adjustments made to data --Company response may result in omission or misclassification of secondary activities --Sampling method results in large firm bias --Sample concentrated on large companies --Company level survey --Definition of capacity not given to [illegible] --Low response rate

TO THE READER:

SEVERAL PAGES OF THE FOLLOWING MATERIAL MAY BE ILLEGIBLE BECAUSE OF THE POOR QUALITY OF THE COPY SUBMITTED FOR MICROFILMING

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

SEP 30 1976

Mr. Victor L. Lowe
Director, General Government
Division
General Accounting Office
Washington, D. C 20548

Dear Mr. Lowe:

Thank you for providing us with the opportunity to comment on the draft entitled, "An Assessment of Capacity Utilization Statistics -- Strengths and Weaknesses." With all of the capacity utilization measures presently being published, including three produced by Federal agencies, this is a timely study. I do have some suggestions which are aimed at strengthening the report, and some reservations about your recommendations.

I would urge that the final report be reorganized to provide a clearer distinction between the Federal programs and the private capacity utilization series. This change would help the reader to focus on your recommendations dealing with only the three Federal programs. In addition, the readers of this report should not confuse the quality and properties of the private sector series with those published by the Federal agencies.

I would hope that the final report could assess the quality of the various series. I feel there is a marked superiority in the quality of the Federal series vis-a-vis those of the private sector. For example in the sample design for the direct surveys, BEA conducts the largest sample of firms among all the programs listed (with the possible exception of Rinfret-Boston), and it is the only one based on stratified probability of selection methods. The Census conducts the only establishment sample, the largest sample of reporting units by far. It is selected on a probability basis as well. The response rate for these Federal surveys -- especially in view of Census' experience with a 95% response for their 1975 mandatory survey -- is far superior to that experienced by the private organizations. The FRB series is undergoing major improvements in methodology. When implemented, the FRB series will become

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the most carefully prepared secondary source series of all those considered. In the industry detail presented, it is also true that the three Federal series are superior and that the BEA series is the only one giving data by size classes.

The reservations cited in your draft report with respect to these series are the following:

- Untimely publication schedule for the BEA and Census series.
- Infrequent observations from the Census Bureau's annual survey.
- Use of the BEA company survey to determine utilization rates by industry.
- Use of McGraw-Hill as an annual benchmark for the FRB series.
- Lack of definition for capacity in the BEA survey.

I would like to discuss each of these in turn, and suggest some ways in which the report could be improved in these respects.

Concerning timeliness of the BEA's publication schedule, I would note that, of the ongoing programs which rely on direct surveys for their periodic reports, only the Rinfret-Boston series is published on a more timely basis. We have no indication from that organization about the size of the sample or the methodology used, although we do know that they accept a significantly lower response rate than does BEA. While an improvement in the timeliness of the BEA publication schedule would be desirable, there is no substantial evidence that a direct survey yielding industry detail in the published results can be done on a more timely basis while maintaining a high quality output.

Concerning the Census publication schedule and lack of frequency, the final report should make note of the purposes of that particular survey. It is designed to provide an indepth picture of industrial capacity utilization and to provide a periodic benchmark on an industry-by-industry basis for the FRB series. While timeliness of publication is not unimportant for these purposes, it is not the highest priority of the Census program. To achieve these purposes requires a larger sample of establishments and a high response rate, each of which takes time to secure.

The draft report points out that the BEA uses company level surveys and thus may not be able to represent industry detail with the accuracy of an establishment report such as that conducted by the Census Bureau. While this comment is well taken and is applied to

several of the other series as well, the final report might include some factors which should be taken into account. The BEA company survey is tied to their plant and equipment expenditures and anticipations survey which indicates the respondent's investment plans. Similarly, this report can be compared with the Federal Trade Commission's Quarterly Financial Report (QFR), conducted on a company basis. The QFR provides income statements and balance sheet positions by industries. Profitability, financial position, and capacity utilization are among the main factors which lead to capital investment, and analyses of data from these similar Federal surveys when taken together can yield a better understanding of such investment plans and hence the business cycle. Thus, when viewed as a whole, the Federal statistical programs made a great deal of sense.

The FRB's use of the McGraw-Hill annual survey as a benchmark is cited as a criticism. It could be pointed out more forcefully in the final report that the FRB plans to use the Census data as a benchmark once sufficient historical data become available.

Turning to the recommendations, the draft report makes the point that there should be a family of capacity definitions developed under the leadership of OMB for use in these surveys. OMB worked with the Census Bureau, nongovernment experts, and reporting firms in the development of the definitions used on the Census questionnaire. The concepts of capacity and its utilization are complex, to say the least, and those employed depend on the purposes for which the information is to be used. Emergency mobilization could perhaps rely on using existing capacity around the clock without concern for long-term plant maintenance, labor market conditions and other factors, and engineering capacity is a useful concept in this case. The level of capacity, and hence its utilization, at cyclical troughs is different from that at cyclical peaks, largely due to the use of outmoded capacity with high levels of demand and prices. Practical capacity is important here. For investment decisions, desired capacity may be the most important. There is little that can be done to advance the state of the art at this point without additional research on these factors, and the report might be revised to focus on this approach rather than proposing further refinement of existing definitions at this time. The comments from all of the private sector compilers of survey data would tend to support this position. The report should, at least, recognize the OMB leadership role in developing the only specific definitions currently in use.

The second recommendation is that OMB designate one agency to calculate the capacity utilization series to serve the needs of all agencies. In fact, OMB did look into the possibility for consolidation of the series after the Census benchmark survey was approved. The comments in the

previous paragraphs indicate that there are important interrelationships between the existing series and other statistics published by the Federal agencies. To centralize the data series, perhaps with a quarterly establishment based survey at Census, would sever the relationships the BEA company based series maintains with other data collected from company decisionmakers, and the FRB series from the industrial production index.

While there may be some public confusion with the three series, that will be reduced significantly after the FRB improves its methodology. As to the public reporting burden aspect of these programs, there is almost no burden from the FRB program, and the BEA survey is not excessive in this regard. The Census' annual survey is burdensome, but that is precisely why we would not consider conducting it on a more frequent basis. Many of the published series are outside the Federal sphere of control and would not be discontinued in any case. Given the different uses of the three Federal activities, I feel they should not be consolidated at this time.

One final suggestion for improving the clarity of the report would be to move some of the descriptive material from the evaluation section to the appropriate paragraphs in the section on the preparers and their methodology. The present mixture in the later section is a bit confusing.

I welcome your inquiry into the adequacy of capacity utilization statistics. I hope you will find my suggestions helpful in drafting the final report.

Sincerely yours,

Paul H. O'Neill
Deputy Director

APPENDIX VII

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Administration
Washington, D.C. 20230

SEP 23 1976

Mr. Henry Eschwege
Director, Community and Economic
Development Division
U.S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Eschwege:

This is in reply to your letter of September 2, 1976, requesting comments on the draft report entitled "An Assessment of Capacity Utilization Statistics -- Strengths and Weaknesses" (B-163762).

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,

Joseph E. Kasputys
Assistant Secretary
for Administration

Enclosure

APPENDIX VII

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

17 SEP 1976

Mr. Henry Eschwege
Director, Community and Economic
Development Division
U.S. General Accounting Office
441 G Street, N.W., ROOM 6146
Washington, D.C. 20548

Dear Mr. Eschwege:

I have reviewed the draft report sent to Secretary Richardson entitled "An Assessment of Capacity Utilization Statistics--Strengths and Weaknesses" and, on the basis of my review and discussions with the Bureau of Economic Analysis and the Bureau of the Census, I offer the following suggestions.

In general, the report is a careful and accurate study of the various measures of capacity utilization. While there are some technical errors, they are not monumental and do not detract from the overall quality of the report. These technical considerations are detailed below.

As one of its major objectives, the report makes two recommendations. These recommendations are that "the Director of the Office of Management and Budget 1) develop, in conjunction with interested organizations, a family of capacity definitions for use in calculating the statistics, and 2) designate a single Federal organization to calculate a capacity utilization series." I feel that these recommendations suffer from an inadequate recognition of the needs of the various users of capacity utilization statistics and that when these needs are appropriately analyzed some modest rewording of the recommendations would be in order.

There are two primary uses of capacity utilization statistics: first, to assess potential bottleneck situations and their inflationary consequences in particular product markets, and second, to assess the

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profits outlook and potential investment decisions for companies who produce for various product markets. It should be clear that these respective areas of analysis require not only different capacity concepts, but different sampling universes as well. The current estimates made by the Bureau of the Census conform, as closely as possible with the establishment or product specification, while the estimates made by the Bureau of Economic Analysis focus on the company, where profits are generated and investment decisions are made.

This distinction has been overlooked in the draft report. As an example, the report states on page 10 that the BEA survey, a company survey, "may result in misclassification of prominent secondary activities." If the focus of attention is only specific products, then the statement is correct. But in the BEA survey, which includes an integrated company-based package of information on actual investment expenditures, anticipated sales and capital outlays, capacity evaluation and utilization, the present classification is not only appropriate but constitutes an important strength of the statistical series.

Furthermore, it is incorrect to infer, as the report appears to do, that the estimation of these statistical series are overlapping and therefore redundant activities. These are distinct activities, largely complementary, and serve specific users. If these activities were to be combined into a single agency there would still be a need for two statistical samples, drawn from two universes, to satisfy all users of these statistics. Since the BEA capacity utilization estimates are derived from their existing plant and equipment survey, the additional cost of these statistics is quite small. If a single agency were to collect both sets of estimates such that the BEA capacity utilization estimates were distinct from the plant and equipment survey, total costs would likely increase. Once this basic difference is accepted, the first recommendation of the report becomes more important, for it is within a product universe that a family of capacity concepts become relevant.

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The Commerce Department has long recognized that the definition of capacity is perhaps the most critical element in capacity measurement. Recently, the Bureau of the Census has done some work to get a better understanding of this problem. Approximately 35 field interviews have been conducted with survey respondents which investigated (among other items) the problems respondents have with the Census definitions. These interviews and telephone conversations with many other respondents have helped identify specific industries which experience difficulty in applying Census definitions to their operations. Although the current definitions of the Bureau of the Census (which were developed in cooperation with many Government agencies) seem appropriate for the majority of U.S. industries, the fact that certain industries have difficulties may distort the estimates for these industries and hence the higher level totals which include these industries. If a series of definitions were constructed which could be applied to particular industries, it would establish a firmer base for the development of capacity estimates. These definitions should be applied on an industry-by-industry basis (4 digit SIC).

It was noted in the draft report that the timeliness of the Census data was less than adequate. The calculation frequency (once a year) was based upon the assignment to the Census Bureau to develop benchmarks for the Federal Reserve Board capacity series. Subsequently, in order to provide additional data relating to capacity, a number of questions were added to the report form. These included questions on the reasons for under-utilization, the number of shifts and hours of production employed at the plant, the length of time to expand to capacity and the time these capacity levels could be maintained, and, finally, how much (and by which method) the practical capacity of the plant could be expanded under an assumption of continuous operations. These additional data, though valuable, make the form more difficult to complete for the respondent and result in publication delays.

There were also other difficulties encountered in starting up a new survey which resulted in the 1973 and 1974 Census

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reports being released quite late. However, there has been a significant improvement in the release of the 1975 data. A press release showing preliminary capacity estimates for 1975 was published in August 1976. The final publication will be available in September or October 1976. In the future, annual utilization rate data should be available five to seven months after the end of the period covered.

Census can collect capacity data quarterly and publish a report within 60 to 90 days of the reporting period. This time estimate assumes a smaller sample with reporting being voluntary. A 75 to 80 percent response rate seems reasonable assuming the form is limited to a few questions on capacity utilization and does not include the detailed questions on the present Census capacity form. These capacity estimates would be based upon individual establishment reports, the value of which were described in the GAO report.

The Census Bureau in conjunction with a quarterly series could also conduct a mandatory annual capacity series designed similar to the present form. This would serve two purposes: (1) the mandatory annual series would benchmark the voluntary quarterly survey to the appropriate levels, and (2) the form would also collect the supplemental capacity information (e.g., reasons for under-utilization, length of time to reach capacity, etc.) which has been most useful in the present Census capacity publication.

In addition to the above comments on the draft report, the following technical errors and additions should be noted:

1) The Census Bureau survey response rate as quoted on pages 27 and 44 indicated that the 1973 response was 69 percent and 1974 was 67 percent. The 1974 response data provided GAO were based on preliminary estimates of response. The actual 1974 rate fell to 62 percent, which the Bureau considered unsatisfactory as a basis for developing reliable estimates of industrial capacity utilization. As a result, the 1975 survey was changed from a voluntary to a mandatory survey, and the response

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for 1975 rose to almost 95 percent, thereby improving the reliability of the data.

2) The report states on page 28 and in the table that the composite utilization rates for durable goods, nondurable goods, primary processing, advanced processing and all manufacturing industries are the average of the industry rates in Census estimates. This is not correct. A composite rate is computed as an average of the employment weighted utilization rates of all of the individual establishments included in that particular composite total. The industry rates themselves are not averaged.

3) In the BEA survey, 2,400 companies is the number of responses, not the number in the sample, which is over 3,000 companies (pages 24 and 41).

4) The BEA sample is designed to cover companies with assets of $100 million and over with certainty, and to cover smaller companies on a representative basis (page 24).

5) The GAO report fails to point out the unique advantages of a company-based survey which permits the development of utilization rates by asset size class. Such data have important analytical uses since they indicate marked differences in both preferred and actual utilization rates, within industries, depending upon the company size.

6) The report does not adequately reference the appropriate source materials used in preparation of the report.

7) There is an inadequate discussion of the actual methodologies used by the various groups to construct these capacity utilization statistics.

8) The chart on page 4 should be accompanied by a table with a listing of the actual data presented in the chart.

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9) On page 3, the report states that "capacity is an economic concept that generally refers to the maximum quantity of output per unit of time using existing plant and equipment." This should be altered to define economic capacity in terms of preferred operating rates.

10) There should be a discussion of the uses of these capacity utilization statistics, focusing on potential capacity bottlenecks, inflation, profits and investment expenditures.

I, or members of my staff, would be willing to discuss further drafts of this report if that were desired.

Sincerely,

Maynard S. Comiez

for John W. Kendrick
Chief Economist
for the Department of Commerce

BOARD OF GOVERNORS
OF THE
FEDERAL RESERVE SYSTEM
WASHINGTON, D. C. 20551

ADDRESS OFFICIAL CORRESPONDENCE
TO THE BOARD

September 13, 1976

Mr. Henry Eschwege, Director
United States General Accounting Office
Community and Economic Development Division
Washington, D.C. 20548

Dear Mr. Eschwege:

I have been asked by Lyle Cramley to review the GAO draft report "An Assessment of Capacity Utilization Statistics -- Strengths and Weaknesses." The report is objective and clearly written, nevertheless the second recommendation "that the Director of the Office of Management and Budget . . . designate a single Federal organization to calculate a capacity utilization series" ignores important factors and is therefore erroneous.

While various utilization rate surveys indicate approximate utilization rate levels, utilization rate estimates derived from detailed production measures show greater cyclical movements than those based solely on business judgments reported in utilization rate surveys. Consequently, both these sources of information should be used to estimate current utilization rates. Thus the government's relatively inexpensive program of capacity utilization measures -- including both surveys and derivations from production indexes -- is not as duplicative as it appears. At a minimum both detailed production measures and an establishment-based survey large enough to provide substantial industry detail, such as is conducted by Census are required.

Undoubtedly, the availability of a variety of private and public estimates of capacity utilization has confused Congressmen, economists, and others; however, this variety of estimates is symptomatic of underlying ambiguities in concept and different approaches to measuring different concepts of capacity and capacity utilization.

An administrative proposal aimed at eliminating the inherent ambiguities by reducing the number of governmental series is aimed purely at the symptoms and not at the underlying problems. The existence of widely-used private estimates such as that estimated at the Wharton School points up this fact. In fact, even the symptom of widely different utilization rates will not be eliminated by your proposal because the Wharton and Rinfret utilization rate services will differ widely in level

Mr. Henry Eschwege

and in movement from any government series based solely on BEA or Census Surveys. In fact, an array of capacity utilization rates corresponding to different concepts is probably warranted as are the sets of unemployment and money supply measures.

As is indicated in your draft report, the FRB itself conducts no capacity utilization survey. Its capacity utilization series are an inexpensive analytical use of the 235 monthly detailed industrial production (IP) indexes in conjunction with utilization rate data from various surveys. The IP indexes have long provided a useful record of monthly detailed and aggregate production developments. The short-term movements of IP are based on more comprehensive data and more definable concepts than are current surveys of capacity utilization. More importantly, the short-term and cyclical movements of utilization reported particularly in the BEA utilization rate survey are inconsistent with production movements. The utilization surveys tend to show less cyclical variation than is consistent with production data. We feel that IP indexes provide a better basis for calculating short-term movements in utilization than do relatively small-scale current surveys based on businessmen's judgments concerning the elusive concept of capacity utilization.

In order to derive utilization rates, the FRB capacity economist estimates capacity consistent with the IP indexes in order to calculate utilization. The Census Bureau's Survey of Plant Capacity has only recently begun to provide us with the quality and detailed quantity of information which will enable the FRB to derive a full set of relatively detailed capacity utilization series. In 2 or 3 years when more Census observations are available, the FRB plans to calculate capacity indexes consistent with each of the IP indexes. More detailed series will be published at that time. The FRB staff agrees with your authors that more detailed utilization rates are more useful than overall aggregates.

Another characteristic of deriving utilization rates from IP series is that other industry data on capacity can be utilized. Excellent information is available for petroleum refinery, paper and pulp, aluminum, copper, raw steel, and certain chemicals and textiles. This data has been used to develop the "major materials" utilization rates which have recently been expanded with the use of the Census survey data to encompass 96 materials series. We believe that the major and total materials series have been the most useful capacity utilization series available because they relate to important bottlenecks and the materials shortages of 1973-74.

We feel that the FRB production indexes in conjunction with the annual large scale Census survey and industry data provide the basis

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Mr. Henry Eschwege

for a very useful system. However, we must also admit that in the past five years the FRB's total manufacturing utilization series has not been updated often enough -- a revision is practically complete and will be published in the Bulletin this fall. More frequent revisions of FRB capacity estimates should improve the usefulness of the utilization rate estimates in current economic analysis.

At the same time we have to recognize, that the period of research and experimentation is not yet finished in this area of statistics. The underlying conceptual and statistical difficulties are of such a magnitude, that a fully acceptable standard definition of capacity and utilization cannot be promulgated yet. This being the case this is an area where we can make the best use of our decentralized statistical system to produce the most effective solution by working on the relevant problems from different angles.

Naturally, the need for proper coordination of these activities remains high. We on our part wish to submit our results to the scrutiny of discussions of all interested parties and hope to be able to do this soon on the basis of our article to be published in the Federal Reserve Bulletin this fall.

Hopefully further discussions can lead to agreements concerning a family of utilization indicators, which will be interrelated, but still different in various regards.

While the preceding text covers our main points, a few brief supplemental comments are also in order:

(i) It should be noted that the BEA tri-monthly survey of 2400 company utilization rates is the only significant quarterly survey of utilization rates. Such a survey provides interim data concerning businessmen's judgments about the utilization of their facilities. We at the FRB use such data to review our estimates although a larger, quarterly establishment-based survey could be more helpful.

(ii) In your draft there was no mention of the costs of the various Federal efforts to estimate capacity utilization. It surely is not very great in comparison to conceptually similar statistics on unemployment. The FRB's program is not very expensive because it is largely a by-product of estimating the industrial production indexes. Most of the data and the computer programs used in calculating capacity utilization are part of the overall production index system.

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Mr. Henry Eschwege

(iii) An error was noted on page 30 of your report -- the FRB does not report "assests of companies for 1974" in any detail for Renfret-Boston to use in calculating utilization rates.

Yours truly,

Richard D Raddock

Richard D, Raddock, Economist
Business Conditions Section
Division of Research and Statistics