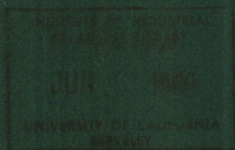


Productivity and Policy Decisions

RICHARD A. BEAUMONT

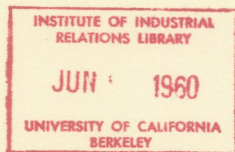
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Productivity
(1958-59 folder)

PRODUCTIVITY AND POLICY DECISIONS _{by}

Richard A. Beaumont



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1959

_{New York}

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Foreword

The idea of linking wages to productivity change is prominent in national economic discussions and has developed as a significant current issue in collective bargaining. In this monograph, a broad review of productivity and its implications for policy decisions is presented as an aid to a better understanding among managers of the concept.

Productivity is regarded here as a general tool of economic analysis, which it is, rather than as a precise tool, which it is not. The implications surrounding the possible application of productivity data to decisions on wages, prices, and profits are considered. It is concluded that regardless of how measured, productivity data can not lead directly to a determination of the distribution of economic gains, whether in the form of higher wages, higher profits or lower prices.

Productivity measures or indexes are more logically indicators of the progress and character of an economic unit or of the economy as a whole. They show the general rate of growth and extent to which the living standard has improved when measured against some selected past period. As pointed out in this monograph, the data do not lend themselves to formula or direct application to the process of wage determination in a single industry or enterprise.

We wish to express appreciation to our colleagues and associates in industry for their careful review of the manuscript and their helpful suggestions. These were invaluable in refining the concepts and ideas presented here by Mr. Beaumont.

CARROLL E. FRENCH,
President

New York City, September 15, 1959

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PRODUCTIVITY AND POLICY DECISIONS

Introduction

Problems of inflation, international industrial competition, and the desire for more goods and services have thrust the concept of productivity into national prominence. Concern was evidenced as early as 1947, when, according to popular discussion, productivity was first related to wages in the debate between the automobile industry and the United Automobile Workers. In 1949, 1954, and 1958, the undulations of the business cycle renewed public awareness of the issue and placed relationships between wages and prices and a continuing inflation under scrutiny. Most recently it has been the negotiations between the steel companies and the Steelworkers Union that have focused attention on productivity.

Productivity has also entered into international considerations as we have compared and contrasted the achievements of the Soviet economy with the American economy to determine the relative industrial progress and status of the two nations. Finally, possible methods of increasing productivity have figured prominently in formal programs designed to help underdeveloped nations improve efficiency and increase their output of goods and services through better utilization of their limited resources.

In this discussion the productivity concept, an economist's tool, is examined. This is a particularly significant time for such a review. For despite the fact that the nation has successfully emerged from the sharpest recession since World War II, the problems of inflation still confront us, and productivity continues as an important factor in world competition and as an issue in negotiations in major industries. This means that relationships between wages, prices and productivity must continue to receive careful attention in considerations of economic policy. In fact, the President has called for the holding of the line on wage levels as a matter of national policy, except as higher wages may be justified by increases in productivity. Such developments have brought considerable pressure to bear

nationally to relate productivity and wage changes more closely.

To the extent that wage changes are determined in negotiations between labor and management in major sectors of the economy, wage rates are established by the collective bargaining process rather than by productivity relationships. But the bargaining process takes place in a setting determined in large part by the dramatic economic achievements of the nation.

From 1948 to 1957, the gross national product of the United States as a whole increased from \$259 billion to \$443 billion.¹ Over this same period, according to one statistical series, productivity for the nation, as expressed in terms of output per man-hour paid, increased 33.4 percent,² indicating the significant growth of the economy as a whole over a full decade. On a year-to-year basis, the estimated average annual change in output per man-hour, which is computed to take into consideration fluctuations in the rate of growth, has been reported by the President's Council of Economic Advisors to be 3.4 percent per year.³

The importance of these changes for the economy is evident; however, for collective bargaining at the company level, where gains and achievements are not congruent with long-run national gains, the problems caused are many. It is important, therefore, to understand productivity and the interrelationships between productivity and wages by examining the meaning of the concept and the methods and complicated nature of the problems of measurement. On this basis, consideration can then be given to national discussions on productivity and the disturbing implications of proposals to base policy decisions on productivity data.

¹ The gross national product during the second quarter of 1959 reached an annual rate of \$485 billion. Gross national product data are from the *Economic Report of the President Transmitted to the Congress January 20, 1958*, Washington: United States Government Printing Office, p. 108; and Council of Economic Advisors, *Economic Indicators*, prepared for the Joint Economic Committee, August, 1959.

² Productivity data drawn from Bureau of Labor Statistics data shown in Appendix A.

³ Contrast this with Solomon Fabricant, *Basic Facts on Productivity Change*, New York: National Bureau of Economic Research, 1959 (Occasional Paper 63), pp. 3-10. The author shows the average annual long-term rate of productivity increase for the years 1889-1953. Over these years, the comparable figure for the average annual increase when capital is included in the ratio is 1.7 percent per year. The 3.4 percent is the change when a short-term increase from 1947 to 1958 is considered, based on an output-per-man-hour concept.

The Productivity Concept

Since standard of living is determined by the total output of the nation per capita of population, the goods and services produced by the economy have real significance for each person. In the United States, output has generally increased each year, and as a result there has been a continuing improvement in the standard of living. Increasing productivity is therefore of vital concern to all.

WHAT IS PRODUCTIVITY?

Productivity measures are intended to show changes in physical output by relating one, several, or all factors of production (frequently referred to as "input") to total output. Basically, the concept is a simple one: productivity is a ratio that compares any or all factors of production, such as capital, labor, or raw materials (input), with the final product or service that is produced (output).

$$\text{Productivity} = \frac{\text{Output}}{\text{Input}}$$

A productivity ratio thus expresses in a rather convenient manner the increases or decreases in output from one period to the next which result from the utilization of more or less or varying proportions of the factors of production. It is possible to construct a productivity ratio to show changes in output as related to any one factor of production, such as labor or capital or the use of electrical energy. This may be done at the job level, the company level and, indeed, for the entire nation. Moreover, the ratios may relate not only one input factor to output; they may be constructed by relating several inputs to output of the company, the industry or the nation.

As a ratio between the output of a productive activity and the utilization of factors of production, the productivity ratio expresses

the success of bringing various resources together in such a way as to create something of value in terms of consumer or capital goods or services. Productivity at the national level is important because where it increases it indicates possible changes that could occur in the standard of living, which is determined by the total of the goods and services available to each person. Thus, if productivity increases for the nation, there are more goods and more services available for consumers, provided that the amount of energy required to produce that output remains the same or does not increase as rapidly as does output. An increase in productivity year after year means that the component factors of production are being used more efficiently, and this means that there can be some combination of more leisure and more wealth (in the form of more goods and services at lower prices or higher quality) for all.

To the extent that all factors of production are related to output, the productivity ratio is an over-all measure of economic efficiency. This comprehensive measure is referred to as "total factor productivity," and it relates *all* inputs to output. As an over-all concept of industrial activity, total factor productivity is far more valid as a gauge of change in output patterns than any other possible ratio of input to output. It relates all aspects of production operations to final output rather than focusing on any one aspect of production which alone could not be representative of the over-all achievements in output.

WHAT ARE THE PROBLEMS?

Despite the basic simplicity of the productivity ratio, the concept of productivity has become confused because of the several ways in which it is expressed and because productivity is confused with profitability. Moreover, the difficulties of measuring productivity and the significance of the several productivity ratios computed at the national level, and those that could be prepared for any single company, vary tremendously.

CONFUSION IN TERMINOLOGY

"Productivity" and "labor productivity" (or more properly, output per man-hour) are two terms that are frequently used inter-

changeably.¹ Labor productivity measures have gained prominence because of national measurement programs of productivity which have depended on some variant of man-hours as an input. The interchangeability of the terms, however, should not suggest that labor productivity approximates a satisfactory measure of the changes in output brought about by the more efficient use of *all* factors of production. In fact, labor productivity is only a partial measure of productivity.² A productivity ratio based on man-hours worked may be contrasted to its reciprocal—man-hours used per unit of output. Relating output to man-hours utilized in production provides a basis for viewing the efficient use of a single factor of production, but this is not a reflection of over-all achievements in output.

An additional confusion arises because productivity may be viewed from two perspectives. One is from the standpoint of the productivity of the individual worker as a producer. Through greater exertion, the worker may increase his output, thereby increasing the output of the firm; this is the base on which incentive plans rest. On the other hand, productivity may be viewed as the achievement of a unit of production—the plant, the firm, the industry, the nation—in maximizing output. Here human effort is only one factor in the equation, and it is the one that is not changing as rapidly as others. Unfortunately, many discussions of productivity confuse these two approaches. It is productivity in its broadest sense that is considered throughout this discussion.

SHORTCOMINGS OF PRODUCTIVITY STATISTICS

The perplexing nature of productivity measurement is that when the concept is expressed as a simple ratio, many shortcomings in the data are not always evident. The compiler of productivity data would ask such questions as: What single input or combination of inputs will be used? How will inputs be measured? If many inputs are to be used in the ratio, how are they to be related to each other in terms of a single unit of measurement? On the output side,

¹ *Economic Report of the President Transmitted to the Congress January 20, 1958*, p. 107.

² John W. Kendrick, "Productivity, Costs and Prices: Concepts and Measures," in *Fifteenth American Assembly* (Columbia University, June, 1959), *Wages, Prices, Profits and Productivity*, p. 39.

what will be the single term that will reflect output? Where dollars are used as the common measure for inputs and output, how are they to be expressed as dollars of constant value, given the changes in the price level?

Any person using productivity data would ask similar questions, for where measures of productivity are derived, they are based on available input and output data which are always difficult to quantify. Most productivity ratios rest on a series of assumptions which tend to be camouflaged by the apparent simplicity of the ratio. Such assumptions relate to the measurement of input and output, and the disagreements concerning them are discussed throughout this chapter. With differing viewpoints on basic assumptions, agreement on measures that rest on those assumptions is unlikely. Additionally, the many public statements on productivity do not clearly point up the differences between productivity measurement at the national level and measurement at the company or industry level. All of these problems will be discussed below.

EXPRESSING INPUT AND OUTPUT IN CONSTANT TERMS

Assuming that it were possible to overcome problems of quantification, or that there is agreement on the derivation and/or meaning of the input and output data to be used, the usual method of constructing a productivity series is to express input data and output data for each of several years in dollar terms and then convert them to constant dollars. This is done because the objective is not to measure productivity at a given time but to determine change in productivity over a period of time. Thus, dollars of the same value must be used throughout, and this means that an appropriate price deflator must be applied to each factor of production and to output in order to eliminate the effect of price changes from one year to another.

In the process of deflating the value of input and output to constant dollars, one or a combination of price indexes is used. Obviously no single deflator is likely to be applicable to all inputs and all outputs; moreover, there are limitations to available price indexes. Another complicating problem in productivity measurement, therefore, is in the development and application of appropriate deflators. But assuming that the problems are overcome and that

there is agreement on the indexes to be used, ratios are then computed and expressed as index numbers, as illustrated in Table 1.

DIFFERENCES BETWEEN NATIONAL PRODUCTIVITY AND COMPANY PRODUCTIVITY

While productivity has significance for the nation, changes in productivity are also important for the single firm. Increases in productivity determine a company's ability to survive under competitive business conditions in which, with all other factors remaining constant, competitors are increasing their productivity. But it is at the company level that another element of confusion occurs in thinking about productivity. At the national level one is concerned with the efficient *use* of *all* resources, and the productivity measures are broad national averages. At the company level, however, the primary concern is *profitability*. The nation is successful if productivity is high and continues to grow; the company is successful only when increased productivity is achieved in the production and successful marketing of products that have *value* in the competitive market.

TABLE 1

PRODUCTIVITY IN A HYPOTHETICAL COMPANY PRODUCING WIGITS *

Year	Number of Wigits (Output)	Market Price of Wigits	Total Value of Wigits (Output) (a × b)	Output in Constant Dollars ^a	Cost of Input ^b	Input in Constant Dollars ^a	Productivity (d ÷ f)	Index of Productivity (1950 = 100)
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
1950	1,000	\$10.00	\$10,000	\$10,000	\$4,000	\$4,000	2.5	100
1951	1,100	10.50	11,550	10,694	4,500	4,167	2.6	103
1952	1,500	13.00	19,500	17,663	4,700	4,257	4.1	166
1953	1,400	14.00	19,600	17,610	5,000	4,492	3.9	157
1954	1,700	14.25	24,225	21,688	5,100	4,566	4.7	190

* Expressed in constant dollars to eliminate the effect of price changes; the Consumer Price Index is used in this illustration as a price deflator, although in specific cases, and to the extent possible, an appropriate and applicable deflator must be found and developed.

^b Input here is purposely not defined. It is assumed to be a combination of several measurable factors expressed in terms of their cost to the company.

* Note: Although the illustration is of a company situation, the same approach is taken in deriving a national productivity series, except that GNP would express output and available data would be used for the input. In the Bureau of Labor Statistics measures of output per man-hour, some form of man-hour data is used.

It is conceivable that a firm could have extremely high rates of productivity and still be in a difficult financial position because its product—which it produces efficiently—is not selling. The classic example of this problem has been among producers of rayon and other synthetics. In their industry the index of output per man-hour increased from 14.2 in 1929, to 268.8 in 1957,³ yet the companies producing rayon have suffered in competition with other textile producers. For the company, therefore, productivity is important, but high productivity does not necessarily mean a profitable operation. Profit is dependent on many factors, including market conditions *plus* productivity increases equal on the average to those achieved by other producers in the same or competing industries.

HOW IS PRODUCTIVITY MEASURED?

AT THE NATIONAL LEVEL

To derive a productivity measure for the nation, it is necessary to start with a figure for national production. This is usually expressed in terms of the gross national product (GNP), which is considered to be the total value of goods and services produced by the economy. The statistical program designed to provide an estimate of GNP is so planned as to remove double counting and express the unique contribution made by each firm or individual in the economy to total output. GNP, therefore, expresses the output of the nation in a single term. It conveniently provides a numerator for the productivity ratio. Thus—

$$\text{National Productivity} = \frac{\text{GNP}}{\text{Input}}$$

There is one input factor on which reasonably complete data are available nationally and which expresses, with some degree of precision, the utilization of the input, and that is labor. In most national productivity measurement programs, therefore, it is labor input, expressed either as the number of man-hours worked or the number of man-hours paid, that is used as the denominator of the

³ Bureau of Labor Statistics, *Indexes of Output Per Man-Hour for Selected Industries, 1919 to 1958*, Washington: United States Department of Labor, April, 1959, p. 6.

ratio. Because of the inadequacies of productivity ratios based on man-hour data, however, a method of relating *total* input to output in a national measurement program is being refined by John Kendrick of the National Bureau of Economic Research in his work to derive "total factor productivity."

AT THE COMPANY OR INDUSTRY LEVEL

For the company, no single convenient measure of output is available as for the nation in the form of the GNP. This would not be a problem if a company produced only one product which remained the same, but such companies are rare indeed. Take any of the major manufacturers in the electrical products industry. They produce a wide range of goods—running from light bulbs through radios, kitchen appliances, industrial generators and electric railroad engines; they also produce, in some divisions, intermediate materials for use by other divisions engaged in producing consumer goods—screws or transistors, for example. The measurement of output for such a company, therefore, is finally determined and controlled by how output is defined and subsequently measured. If output is measured in terms of dollars, then the cost of intermediate products (the screws and transistors) could be established in terms of going prices, or based on an arbitrary value to the company, or considered as the value the intermediate product contributes to the final product. Assuming it is possible to determine and aggregate the prices of a company's output, the productivity ratio would be:

$$\text{Productivity} = \frac{\text{Market Price of Output}}{\text{Input}}$$

In this ratio, the same problem occurs with respect to input as at the national level, in that it is difficult to determine which input, or combination of inputs, is to be used, and how it is to be quantified, as will be shown.

STATISTICS ON NATIONAL PRODUCTIVITY

Productivity measures computed for the nation by the Bureau of Labor Statistics have appeared in reports of the President's

Council of Economic Advisors. The Joint Economic Committee of the United States Congress has also produced a productivity series. However, data are not published regularly by any government agency. The National Bureau of Economic Research, a private research organization, has done work relating to "total factor productivity" and productivity data for historical periods, as well as for current periods, which has been particularly significant in contributing to an understanding of productivity.

The national approach to productivity measurement taken by various government agencies and the National Bureau of Economic Research relies on the national income statistical series. Gross national product, drawn from this series, is the numerator in productivity ratios. Such national income data, since they are given in terms of constant dollars, provide a convenient measure of national output by expressing the total dollar value of goods and services produced by the economy. For government agency measures of productivity, some variant of total man-hours is used in the denominator.

With these national income data, it is possible to compute productivity ratios for various levels of economic activity. For example, in determining productivity for the domestic private economy (excluding government), gross national product is reduced by the contribution made to it by government; for the domestic private nonfarm economy, GNP is further reduced by the contribution of agriculture. Similarly, a variety of denominators could be made available as input factors to permit the development of a broad series of productivity ratios, all of which would have some value in understanding the movements and changes which occur in the production of goods and services in the economy.⁴

Two major national productivity series are prepared by government agencies. They are partial measures of productivity, and they differ primarily with respect to the man-hour data used in the denominator of the ratios. One series is based generally on man-hours worked. This is derived from data from the United States Bureau of the Census. The other is prepared almost entirely from Bureau of Labor Statistics data and tends to be based on man-hours paid. Since man-hours paid provides a denominator that is greater

⁴ Fabricant, *op. cit.*, p. 5.

than man-hours worked, productivity changes shown in series resting on the man-hours-paid denominator are lower than those resting on man-hours worked.

In addition to the above mentioned programs, the Bureau of Labor Statistics prepares productivity data for several industries. These data are based on reports of production and hours worked which the Bureau receives from employer groups and directly from companies.

The Bureau is presently seeking to supplement its budget by over \$1 million per annum in order to refine, improve and expand its work in estimating productivity and preparing wage statistics. The plan is to include wages as well as the costs of employee benefits in the data collection program. It is proposed to gather data for white-collar employment, including professional and technical occupations as well as production work.

The national measurements of productivity present data that are extremely useful in analyzing the trends in output for the nation and for industries within the nation. The national measurement programs, however, do not provide precise tools. They do not purport to measure with fine precision the changes in output within an industry or for the nation from one year to the next. Moreover, productivity ratios rest on data which have many limitations. The measures are adequate, however, to provide an understanding of the trends in output for particular sectors of industrial activity.

WHAT MUST BE CONSIDERED IN USING PRODUCTIVITY MEASURES?

The importance of productivity data as a gauge of the success of individual companies and of the nation often overshadows the real problems which must be understood in measuring productivity change if the data are to have meaning. Too frequently productivity is viewed as a score. Unfortunately, scores suggest a degree of finality with which productivity ratios are not endowed.

Productivity measures are broad generalizations, frequently tentative, based on a series of estimates which may contain offsetting errors and which, more accurately, give a picture of trends in output for the nation or for a company. The difficulties underlying

productivity measurement and the various factors which must be considered in using productivity data are presented below. The discussion is directed to (1) productivity as a long-run concept, (2) the limitation of productivity and labor productivity measures, (3) the difficulties of determining the rate of change, and (4) the effect of secular changes in the economy.

PRODUCTIVITY AS A LONG-RUN CONCEPT

The significance of productivity resting on total output is that it embraces all of the factors which affect production in one way or another—the specific quantity and quality of labor, capital, and raw materials utilized in production, as well as broad socio-political factors which affect the inputs and form the setting within which a plant operates. All factors certainly change to some extent from year to year, but it is over longer periods of time that they so obviously affect production. As a comprehensive measure based on changes that occur over the long run, a productivity ratio is concerned with secular change, whether at the company or national level. Productivity may increase or decrease in any given year. The significance of the increase or decrease is determined by the persistence of the change and the impact it will have on productivity in future periods.

Changes in Inputs

An increase in productivity may be part of a long-run change in scale of operations or in methods of production, as illustrated by assembly-line techniques introduced in the 1920's and 1930's. It may arise out of the shift from an agricultural to an industrialized economy, typified by the United States at the turn of the century and by the Soviet Union today. It may be the result of the utilization of better, more efficient sources of energy, as may occur, for example, when the power used by industry improves from animal power to steam power, to electrical power and perhaps to atomic power. Decreases occur when raw materials are depleted in mining operations. Decreases may also occur as a plant shifts from one productive technique to another when a considerable period of time is required for new methods to "set in" before they contribute to

output. This type of momentary decrease in a secular output pattern has been typical in companies that introduced integrated and electronic data processing systems. Here a period of lower productivity is generally anticipated at the outset while procedures are refined, new techniques discovered, and skills developed.

To enumerate significant influencing factors, productivity may change due to shifts or changes in:

- Managerial methods and procedures,
- Efficiency, attitudes and educational achievements of employees at all levels of work,
- Availability of employees (during war, for example, marginal personnel is employed),
- Technology,
- Scale of operations,
- Utilization of energy in production,
- Source or quality of raw materials,
- Availability of capital,
- Competitive balance between companies,
- Social, political and international environment,
- Types of productive units,
- Vagaries of the weather (primarily in agriculture),
- "Product mix."

Changes in Output

Up to this point changes over time in factors of production have been cited as making the productivity ratio especially significant as a long-run concept. Changes also occur on the output side in terms of the *nature*, the *quality* and the *price* of what is produced. These changes are significant in understanding productivity.

Changes in the Nature of Products. In office machinery, the electric typewriter was a relative oddity 20 years ago; today it is commonly found. Punch card applications have been common for some time, but the equipment of today is far different in terms of speed and capability. In transportation, we have moved to jet airliners from the more common rail transportation; in construction,

the stone and cement office building of 20 years ago contrasts to the curtain-wall construction of today.

Changes in the Quality of Products. While changes in the nature of products are dramatic, quality changes can be equally significant, as illustrated by the improvements which have been made in household appliances from one year to the next, or in the automobile when 1960 models are contrasted with those of last year or five years ago. Deterioration in quality is also possible, as occurred with many products because of wartime shortages. The measurement problem posed here is a most difficult one. As Duane Evans states it, "Another difficulty in measuring production, even where only a single product is involved, is that the yardstick may stretch or shrink. Quite generally, quality tends to improve, or at least change, but seldom is the change measured or measurable. Quality change is usually ignored in the preparation of production indexes, including those used in measuring productivity."⁵

Changes in the Price of Products. This change, which comes to bear over the long run on the output side, is especially significant because output is usually expressed in terms of price. If a company produces several different products, the output of that company would generally be determined by totaling the value of all output in terms of market price. But prices change from one year to the next, as the many available price indexes show. Thus, to have a consistent measure of output, it is necessary to account for a price change in productivity measurement programs.

Satisfactory price series may be available for recent years for deflating—reducing to constant dollars—output as measured in dollars. In multiproduct industries, however, this may not be so. Moreover, the problem of the selection of the base year also has a bearing on the ratios. To illustrate: output per man-hour paid in the total private economy (excluding the output of government operations) increased by 30.6 percent from 1948 to 1957, if 1948 is used as a base year; it increased by almost 37 percent from 1947

⁵ "Productivity and Wages," in W. S. Woytinsky and Associates, *Employment and Wages in the United States*, New York: Twentieth Century Fund, 1953, p. 64.

to 1957, if 1947 is used as the base year.⁶ Based on these data, the index of productivity in 1957 could be either 130.6 or 137.0. Thus, by manipulation of the base year it is possible to show any level of productivity or productivity change which one might want to present. The influence of a combination of factors in the particular base year or period determines productivity rates as statistical measures. Generally, a more recent base period will yield a lower rate of increase in productivity—either because prices are simply higher in more recent periods or because, as output expands, relative price tends to drop.

LIMITATIONS IN LABOR PRODUCTIVITY MEASURES

As already discussed, the confusion in terminology between *labor productivity* (a partial measure) and *productivity* is an historical one, growing out of the difficulties of obtaining a satisfactory measure for any input except for labor. While there may be some who still hold the view that increases in output could only result from additional energy expended by workers, all of the factors of production contribute to increases in productivity. Labor is only one factor among many, and it is the one that does not change or improve as rapidly as do some of the others.

Among those who still believe that labor productivity is the only measure of productivity that is available or meaningful, a few hold this view because of historical familiarity with the idea of labor productivity; the others feel that labor productivity tends to express the interrelationship that exists between the human and physical factors in the productive economy, and they consider it futile to attempt to separate the concept of productivity from labor productivity.

The fallacy of viewing productivity only in terms of the labor input explains the need for such statements as the one by the Steel Industry Board in its "Report to the President of the United States on the Labor Dispute in the Basic Steel Industry," submitted September 10, 1949, when the Board said:

The labor productivity argument—As used in this report the term "labor productivity" refers to physical output

⁶ See discussion and "Table 1" and "Table 2" in Bureau of National Affairs, *Daily Labor Report*, No. 60, March 26, 1958, pp. B-3, B-4.

per hour worked by nonsupervisory labor. Such output per labor-hour is obtained by dividing the amount of product—e.g., ingots or finished steel (or both) in tons—by the number of labor hours required to produce the output in a given period of time. There is no implication in the use of the term that labor or any other factor of production has been responsible in any particular degree for any change in productivity as related to labor-hours.

Measuring the Actual Contribution of Supervisors and Managers

In the above statement, reference is made to the difference between nonsupervisory and supervisory time as an input factor. This is another problem in the use of labor as the only input factor.

If there is justification for using nonsupervisory time alone in productivity measurement programs, it is that data on time worked by supervisory or managerial personnel is simply not available in a form that reflects their contribution to output. Not reflecting salaried workers in the input data, however, ignores the most rapidly changing characteristic of the workforce. Moreover, there is a problem in weighting hours so that an hour worked by a janitor, for example, would carry an influence on productivity relative to the contribution of an hour worked by an engineer or the president of a company. If hours of managerial, supervisory, and highly skilled employees are to be included without weighting, the janitor would be represented in the ratios as contributing as much to output as the president of the company.

Developments in automation and the continuing trend toward the utilization of higher skills in plants mean that the *quality* of the labor input factor used by industry is also changing. The simple inclusion in a labor productivity ratio of the time of supervisors, professionals, and technicians would obviously tend to show a lower rate of output than where such time was not included. But if included in relationship to their actual contribution to output, a higher rate of productivity change would be shown. Additionally, the use of total labor costs would also reduce the productivity ratio.

These more refined data are not generally used because hours of wage earners are more usually available nationally and because it is difficult to properly weight supervisory time relative to non-

supervisory time when company measures are prepared—although hours of wage and salary workers are available for some industries. It is evident that considerable study is necessary to find techniques by which man-hours may be related in a more sensible fashion so as to give credit to the unique and relative contribution to output of each type of labor input, from the lowest level of skilled employee up to the highest level of management.

Differences Between "Hours Worked," "Hours Paid" and "Total Labor Costs"

Another matter concerning labor productivity must be considered. *Hours worked* are the total number of actual hours on the job. *Hours paid* include paid holidays, paid vacations, paid sick leave and premium pay. Actually, one can move from *hours worked* to *hours paid for* and finally to *total labor cost* as an input factor. *Total labor cost* would include, in addition to hours paid, employer costs for pensions, life insurance and other employee benefits. As premium pay and benefits increase, as they have over the last decade, they become a most significant cost factor on the input side.

These differences make it essential to examine productivity data to determine what base the series rests on—nonsupervisory man-hours worked, total man-hours worked, nonsupervisory man-hours paid for, or total man-hours paid for. The most interesting problems encountered, because of the differences between hours worked and hours paid, are found in national measurement programs, as already discussed, in which two different but somewhat overlapping series of data are available—one based on Bureau of Labor Statistics data, and the other on Census Bureau data.

ALTERNATIVE WAYS TO MEASURE THE RATE OF CHANGE

The question of "what is the productivity change compared to the last period" inevitably enters into discussions on productivity. In *Basic Facts on Productivity Change*, Solomon Fabricant of the National Bureau of Economic Research shows 45 different rates of change in productivity for the period 1889-1953. These are derived by using different input and output concepts. By shifting base years and/or starting a series in different years, an even greater

number of rates could be developed. In addition, there are alternative methods of computing rates of change in deriving a productivity trend that could be translated to wage changes, each relating to an alternative way of developing a trend line, and ranging from the simplest arithmetic technique to more complicated approaches.⁷

EFFECT OF SECULAR CHANGES IN THE ECONOMY

Changes and adjustments which take place in the community with the passage of time may have an effect on the productivity of the company or the nation. These may be social, physical, or educational movements which affect the workforce. Such changes may make the individual more or less productive, or make him more or less adaptable to new types of production. Changes in environmental factors may lead to a reduction or increase in turnover. Peace or war, or a continuation of the cold war, may make for a more or less emotionally stable workforce. A company's share of the market may grow or shrink, thereby affecting its output patterns, or war may force the use of marginal factors of production, thereby decreasing productivity.

One of the best examples of a secular change which affected productivity is illustrated by the following: Before a total economy productivity measure was available, Bureau of Labor Statistics data for manufacturing were assumed to overstate productivity increases for the nation, as they excluded the agricultural sector of the economy. But by the inclusion of agriculture, greater increases in productivity were indicated for the nation than for manufacturing alone, reflecting the tremendous structural changes which have occurred in American agriculture. It is clear, therefore, that national productivity measures may reflect not only changes in output patterns as they occur among companies but also shifts in

⁷ Several methods of computing such averages are available. They may be found in any standard book on statistics. To summarize them: *first*, there is straight averaging, in which the total increase over a period is averaged out to show the average for each of the years of the period; *second*, a moving average, based on the percentage changes from one year to the next, could be computed; *third*, it is possible to compound the increases one year after the next, as in compound interest computations, to determine rate of change; *fourth*, the technique of computing a trend line of best fit could be used, whereby a straight-line trend (least squares) or a more complicated trend in the form of a curve could be computed.

the relative significance of industries to the output patterns of the economy.

WHAT ARE THE SPECIAL ISSUES AT THE COMPANY LEVEL?

It has not been possible to discuss productivity without frequently referring to the differences between national productivity and the measurement of productivity at the company level. For guidance in formulating national policy, broad indicators of trends in productivity for all productive operations are satisfactory. Similar generalizations as they apply to a company also may be of value, for although they are not precise, they can, as indicators, be surrounded with the judgment necessary to infuse them with meaning. Although many of the special problems in measuring and using productivity by a single firm or plant have already been noted in this discussion, a recapitulation is worthwhile, if only to underscore the significant differences between company and national productivity data.

Difference Between Productivity and Profit. Profit emerges from the success of a company in the product market. Where a company competes successfully and productivity increases progressively, the company is in a relatively sound position. The conflict for a company with increasing productivity in contrast to profitability is illustrated by this excerpt from a letter from the American Can Company to its employees: "We now turn out more cans per man-hour, but we now get *less* money back from customers in proportion to the cost of each hour. In other words, our productivity measures tell us that in spite of 28 per cent more cans per man-hour over this ten-year period, our output per man-hour has gone down 6.4 per cent in dollar value."⁸

The Problem of Expressing Company Output. Although there are methods of establishing the value of the total output of the nation through national income statistics for determining national

⁸ Letter of August 7, 1959, from William F. May, Vice President, reproduced in *Daily Labor Report*, No. 157, August 12, 1959, pp. B-1—B-4.

productivity, such methods are not available for the firm. Companies produce more than one product, and they produce intermediate products. Moreover, the long-run changes in output—quality, nature and price—have as much of an impact on the firm's output as they have in national measurement programs.

Effect of Changes in the Quality and Nature of Inputs. On the input side, the quality and nature of inputs also change without a change in the quantity of input. If service formerly performed by the company is now bought, the company's productivity ratio is affected in two ways. First, output per unit of measurable input for the firm would increase enormously though output per unit of *total* input—assuming all costs of production are included in the ratio—may not have increased at all. Second, capital would no longer be tied up in service assets for long periods of time—as when trucks are rented rather than purchased—and it could be turned to more important areas of investment for the company. While it is true that the success of an investment program would be reflected in productivity increases, this would only show up *over the long run*. Hence, short-run measures for a company may lead to improper conclusions if no consideration is given to the changing patterns of organization and investment in plant and facilities which accompany changing methods of operation.

The Special Significance of Innovation. Innovation in industry and the changes in manpower utilization have led to dramatic changes in methods of operation, thereby leading to startling increases in productivity. These are not reflected in the usual productivity measurement programs in terms that would identify the reasons for improvement; yet they are most significant. In a recent study, it is stated “. . . that greater utilization of high-talent manpower in industry is primarily the consequence of innovations of various kinds. Thus, as our society places ever more emphasis on finding new and better techniques of production and organization, the proportion of the highly trained human resources it employs will rise. In essence, the pace of innovation is linked to the rate of increase and the effectiveness of utilization of brainpower in the labor force. If the pace of innovation should slacken in the years

to come, the shift to higher-level human resources in industry might be halted; if it should quicken, the substitution of both brainpower and capital for manual and clerical labor is likely to be accelerated.”⁹

Effect of Changes in Raw Materials. Changes occur not only in a company's products but, dramatically, in terms of the raw materials utilized in the production process. For example, metal refining companies have had special problems in maintaining productivity when ore supplies were being exhausted and marginal supplies were drawn on, or when ore was being mined at considerable distances from where it was to be refined.

SUMMARY OF PROBLEMS SURROUNDING THE PRODUCTIVITY CONCEPT

Increases in productivity as a ratio of input to output mean that there is a continuing improvement in the use of the factors of production. At the national level there appears to be an over-all increase in productivity. This national productivity pattern is a summation of the rates of productivity change for the many firms of the nation.

At the company level, productivity cannot be viewed the same as measures of productivity for the nation. High productivity may or may not be related to profitability which, in contrast to the nation at large, is the measure of company success. Low productivity may not be the result of poor management or a low level of worker effort, but it may arise from the nature of the enterprise or the fact that changes are occurring in methods of operation or in the quality of raw materials or in the product market. Thus, for the single firm, productivity must be viewed over the long run by taking account of the impact of all of the factors of production, including such unmeasurable elements as the skill of management and market factors.

While productivity measurements are useful in judging the general success of the nation or the productive operations of a company, they are not definitive scores. There are many shortcomings in the

⁹ Samuel E. Hill and Frederick Harbison, *Manpower and Innovation in American Industry*, Princeton, N.J.: Industrial Relations Section, Princeton University, 1959, p. 59.

measurement of change and many alternative methods of considering change. Moreover, there are many problems in quantifying the data that underlie the productivity ratios. Resolving the problems is difficult, but agreeing on assumptions on which measures may be based is possible. Productivity data based on these assumptions can be useful as tools of analysis to summarize over-all trends in efficiency, provided they are understood and properly applied as generalizations. Conversely, they may be completely misleading if inappropriately applied.

It would appear that the best measure of productivity is that which embraces all factors of production, for it most nearly expresses the total accomplishment of the productive activities of a company or the nation. Thus, "total factor productivity" is the most comprehensive productivity measure. Furthermore, it is most significant over the long run, for it is with the passage of time that changes in methods of production and changes in the factors of production have time to "set in" and reflect themselves in changes in the level of output. But any long-run expression of productivity, derived as it must be from data that are not precise, does not permit definitive, precise judgments to be drawn on output patterns.

In choosing between having no measure of productivity or a statistical series that rests on recognized assumptions, it becomes essential to understand the limitations imposed by the data. Because of these limitations it is dangerous to use productivity data to precisely determine the movements of prices on the one hand, or wages on the other, in any specific case. Yet this is currently the general drift of opinion. The implications arising from such a development and the controversy surrounding it are discussed in the next chapter.

Implications for Decision-Making

The possibility of determining wage changes by linking them to productivity changes has become attractive despite the shortcomings of available data, the problems inherent in the methods of analyzing these data, and the fact that the relationships between productivity and wages are neither simple nor direct. Some government economists have considered the possibility of using productivity data for adjusting wages in a more or less systematic manner, although they have not clearly defined their concept of productivity. Union leaders have used the productivity argument as part of their arsenal of weapons in negotiations and in appealing to the public for support of bargaining positions.

Actually, it is surprising to find the number of people in responsible positions who have assumed that the productivity concept can introduce rationality into wage determination. Recently, an article in a respected and widely read newspaper discussed practices that could help establish peaceful labor-management relations but which were falling out of favor with labor and/or management. One of these was the adjustment of wages through the use of an annual improvement factor as contained in the contract of General Motors and the United Automobile Workers. The author of the article commented: "In the current reorientation of management thinking about bargaining, this plan [the annual improvement factor] has come in for sharp attack. Its elimination would remove almost *the only scientific method* now in widespread use for determining what is a reasonable pay increase."¹ (Italics ours.)

Alternative views regarding the question of basing wages on productivity, however the term may be defined, can be seen in clearer perspective if the background factors, the opposing positions, and past experience in using productivity as a wage deter-

¹ A. H. Raskin, "Labor: A New 'Era of Bad Feeling'?", *The New York Times Magazine*, July 5, 1959, p. 19.

minant are explored. The developments since World War II can throw light on the reasons for the appeal of the idea of tying wages to productivity, and these will be reviewed to determine the part, if any, that productivity data, in any form, should play in decisions on wages and salaries.

THE BACKGROUND FACTORS

The outlook of the postwar period was colored by two dominant influences: (1) the prevailing belief that depression and extreme unemployment would follow the war, and (2) the fear that the unsettled nature of labor-management relations would contribute to a disruption of the balance then existing in the economy. During this period, the nation was experiencing prosperity considered to be derived from the pressure created by the unsatisfied demand which had accumulated during the war for goods and services. The issue of the period was what would have to be done to keep the national economy from dropping back to its prewar levels once existing demand was satisfied. Thus, the questions of economic stability and growth and labor relations emerged as important national issues.

Legislative Developments. Economic uncertainty and the need to achieve balance and growth as a matter of national policy led Congress to enact the Employment Act of 1946. This significant legislation established for the first time a broad economic policy for the nation. To fulfill the legislative mandate, maximum employment, production and purchasing power were to be promoted by the federal government. This legislation has practically established a national forum for the consideration of economic matters. Under the Act, an economic report is prepared by the President, transmitted to Congress, and joint congressional hearings are held on the report.

The same period also saw another attempt to deal with factors that might disrupt the balance felt important to the national economy—the enactment of the Taft-Hartley amendments to the National Labor Relations Act. Under this legislation, the President was empowered to intervene where a threatened or actual strike or lockout

would "... imperil the national health and safety." Thus, by 1948, many felt that the federal government was in a position to take steps to provide for an orderly approach to basic economic problems, as well as to avoid disputes that might have a deleterious effect on the economy as a whole.

Labor-Management Developments. At the company level, the desire for stability in labor relations seemed to be manifested in the 1948 negotiations in the automobile industry. In that year General Motors Corporation negotiated in its contract with the United Automobile Workers a clause which provided for an "annual improvement factor," under which the company agreed to advance wages in line with "the advancing prosperity of the nation."² This set a precedent for what many writers and observers have come to consider as an approach to wage setting based on expectations of increases in national productivity. The GM-UAW clause was retained in contracts in the automobile industry in 1950, 1955, and 1958.

Acceptance of the annual improvement factor in 1948 contracts, and its retention in 1950 agreements, appeared to be the concession which provided the automobile industry with contracts of a longer duration than might ordinarily have been achieved. Both in 1948 and again in 1950, the industry was seeking long-term settlements which were important to it in a period of increased consumer demand and at a time when the companies were making heavy investments in plant and equipment.

Emerging Opinions. The introduction of the annual improvement factor led to speculation over developing a formula method of wage determination that could avoid wage disputes which might be detrimental to the economy at large. It was reasoned that wage changes arranged in a more or less automatic manner could facilitate or perhaps bypass the bargaining process and thus avoid situations which could lead to strikes. But, as time passed, what was purely a matter of concern in collective bargaining and wage determination

² C. E. Wilson, President of General Motors, *Productivity—The Key to Progress*. Address at the Wharton School of Finance, University of Pennsylvania, November 13, 1950.

became a much broader issue. Wage levels and productivity, as related to inflation and recession, have come to be constantly debated at the national policy level.

Among others, the Council of Economic Advisors (created under the Employment Act of 1946) has proposed a closer relation between wages and productivity. The Council approached the problem from the standpoint of its interest in a balanced economy which would show constant and steady increases in output. This was the theme of the Annual Economic Review in 1950. It was argued that to achieve balance and growth, "since wages constitute the bulk of personal income, the soundest general formula, once wages, prices, and profits are in a workable relationship, is for money wages to increase with productivity trends in the whole economy."³

Obviously, the Council was concerned over the fact that there were short periods during which wage changes were seriously out of line with productivity increases, even though, over the long run, average wage changes kept pace with productivity changes. The Council observed, in its 1950 report, that there would be firms in which productivity increased at rates greater than or less than the average, and that these types of situations would have to be reflected in wage adjustments. While the Council's interest in the process was a sincere one, all it could offer as a method of using productivity in wage determination was the following: "The detailed process of adjusting individual wages and prices to productivity must necessarily be pragmatic." As the Council saw it, the obligation to develop the formulas for relating wages to productivity rests with labor and management who "... have a most challenging opportunity to develop some broad economic principles for wage negotiation which take account both of the over-all national situation and of widely differing situations in different areas, industries, and businesses."

The Council proposed a two-phase program. First, it called for a study of the determinants of a sound, reasonable wage policy which would appeal to both management and labor. Second, the Council itself planned to study the possibility of holding confer-

³ Quotations in this and the following paragraph are from *The Economic Report of the President Transmitted to the Congress, January 6, 1950*, Washington: United States Government Printing Office, p. 101.

ences that could be concerned with conditions and actions important to a stable, growing economy.

ISSUES IN THE NATIONAL CONTROVERSY

In seeking a solution to economic problems by achieving maximum employment, maximum output, and the maintenance of high levels of purchasing power to provide employment opportunities for all those who were in the labor market, the Employment Act of 1946 established goals which have continued to be important. There is recognition of the need for economic balance in the maximization of employment and output. Moreover, this has been highlighted by the nation's experience with inflation which has led many to insist on the establishment of economic stability as a goal for the national economy.

Efforts to find a means of avoiding economic downswings and of maintaining high levels of output have been accompanied by public debate over how economic balance could be maintained with respect to wages, prices, profits and output. At what point is balance among these factors most favorable to the total economy and therefore to the long-run well-being of companies and individual wage earners? It is this question that has precipitated a national controversy which has continued over the years and on which opposite positions have generally been taken by labor and management. The controversy involves productivity, but it differs greatly from the more technical one concerned with the difficulties of measuring productivity.

In this major national debate on the state of the economy, it is national productivity that is introduced, but only in its broadest relationship to wage, price, and profit relationships. The very existence of the debate, forcing management and labor to press their particular views, has tended to clarify the theoretical relationship between wages and productivity. The danger, however, is that in time it will come to be accepted that this theoretical relationship can be translated into a wage determination process. It is important, therefore, to consider two major alternate views on wage, price, and productivity relationships.

**VIEWING PRODUCTIVITY AND WAGE RELATIONSHIPS
IN TERMS OF COST**

According to one view, if wages and other employment costs increase faster than total factor productivity, inflation must follow, and such inflation must inevitably lead to an economic downswing. This position is taken by a rather large and reputable group of observers who view productivity and wage relationships in terms of cost. They hold that the basic cycle is a simple one. When wages go up, where they are not offset by improved efficiency, prices must also go up. This is the start of a wage-price spiral, the inevitable consequence of which is a dip in employment and output, as occurred in late 1957 and early 1958.

This stand is reflected in numerous opinions of which there are two major variants. One of these is that where productivity increases, it is not enough to increase wages alone, for without appropriate rewards to risk-takers, profits will not be realized, and the basis for future productivity gains will not be available. The other is concerned with wage increases that are not justified by productivity increases, since such wage increases may have led to the postwar inflation.

While Wages Must Be Adequate, Profits Must Also Be Adequate

A certain level of profitability must be achieved in our economic system. When consumption is high but profits are not adequate, prices are increased. Where prices cannot be increased, problems arise. This was pointed out in a joint statement of the presidents of the Federal Reserve Banks, given in April, 1958, when, in response to a questionnaire from the Senate Finance Committee, they reviewed the then current recession.⁴

They blamed both labor and management for the downswing in economic activity, citing the wage-price spiral as having caused inflation. The problem was analyzed in these terms: In good times labor pushes harder for wage gains and management tends to give in more easily. This is not inflationary because generally during the growth period of the cycle there is an improvement in output

⁴ *Daily Labor Report* (Bureau of National Affairs, Washington), No. 83, April 28, 1958, pp. B-8—B-11.

patterns and efficiency. But at the high point of a business cycle productivity is not increasing as fast as it was earlier, and it cannot balance off the higher wage levels. Consequently, the economy is thrown into the downswing phase of the cycle.

Another point of view was presented by Benjamin F. Fairless, president of the American Iron and Steel Institute, who argued that the idea that higher wages could reverse the economic downswing, evident at that time, is erroneous. He pointed out that, rather than wages following profits, what had happened was that wages had increased faster than productivity and that such increases meant lower levels of profitability. He maintained that where profits are low, investment by companies in plant and equipment for increased production must drop, and that lower production means an increase in unemployment.⁵

The Committee for Economic Development also examined the question of profits and productivity. In a statement published in February, 1958, it noted a long-term increase in productivity in the United States which derived from the continuing expansion of private enterprise. The CED said that the basis for economic growth is to be found in the drive for profit, but that there are threats to the growth pattern of the country's industry, because of demands for subsidies, higher tariffs, import quotas, and the actions of labor unions which resist change and impede progress.⁶

Also, at the same time, the Guaranty Trust Company of New York discussed in its monthly report the possibility of basing wage differentials on varying levels of productivity in different plants or industries. It concluded that such a relationship would not permit the economic freedom essential to the nation's progress.⁷

A "Cost-Push" Inflation Arises When Wages Increase Faster Than Productivity

A slightly different though closely related line of reasoning is involved when a "cost-push" inflation is referred to. This is best illustrated by the report of testimony by Theodore O. Yntema of

⁵ *Daily Labor Report*, No. 21, January 1, 1958, p. A-7.

⁶ Committee for Economic Development (New York), *Economic Growth in the United States*, February, 1958, pp. 46-48.

⁷ "Productivity as a Wage Determinant," *The Guaranty Survey*, Vol. XXXVII, February, 1958, pp. 1-3.

Ford Motor Company in February, 1958, in connection with hearings of the Senate Subcommittee on Antitrust and Monopoly.⁸ Mr. Yntema said that monetary and fiscal controls are significant in controlling inflation, but that wage increases in any given sector of the economy make the monetary and fiscal controls far more difficult to exercise than where wage increases are not occurring. Moreover, he said that the monopoly power of unions must be brought under some type of control if the impact of "the cost-push inflation of labor unions" is to be reduced. He pointed out that in this "cost-push" inflationary situation we must distinguish the cases in which labor is not entitled to the productivity increases that it does not create. The "cost-push" argument of Mr. Yntema is simply that where wages increase faster than productivity, costs must go up; this means that costs and not prices lead the inflation.

Toward the end of June, 1958, the Senate Finance Committee issued the comments it received from economists who were asked to consider economic conditions. In his presentation, Gottfried Haberler of Harvard University pointed out that wage policy may well become the crucial factor in inflation and deflation. He noted that wage escalators tend to speed up inflation and to lead to price instability.⁹ This is especially so where wages advance faster than average productivity for the nation.

Companies incurring increases in employment costs that do not rest on productivity gains end up with higher costs of production, which, according to the "cost-push" argument, must eventually lead to higher prices. One way to forestall such a situation is to attempt to hold wages to the productivity gains that are actually achieved and to be certain that employment costs do not increase faster than the rewards to all other factors of production. This appeared to be the concern of Roger Blough, chairman of United States Steel Corporation, in December, 1958, when he viewed the "cost-push" inflation (inflation resulting from increased costs due to wage increases) as one that would continue to force prices up and said that the 1959 negotiations in the steel industry would make it difficult not to "add fuel to the inflation fire." In Mr.

⁸ *Daily Labor Report*, No. 24, February 4, 1958, pp. A-5—A-8, D-1; also No. 25, February 5, 1958, pp. A-3—A-6.

⁹ *Daily Labor Report*, No. 124, June 25, 1958, p. A-4.

Blough's opinion, the problem is most serious viewed in the light of Russia's industrial gains. Despite "[Soviet] expansion, there today are some groups who would tax away our corporate profits, or even bargain them away with uneconomic wage increases, at a time when our industrial resources are so vitally needed."¹⁰

In short, where there is an increase in wages which is not justified by productivity increases, the following may occur:

1. Profits must drop, especially if wages increase, and this means that risk-takers will not make the investments needed for the significant future gains in productivity demanded by the nature and size of our mass production economy.

2. Inflation follows because the wage increases must be reflected in increased prices.

VIEWING PRODUCTIVITY AND WAGES IN TERMS OF CONSUMPTION

To this point the problem of inflation has been examined as it relates to costs and profit; the discussion has been concerned only secondarily with the importance of consumption in the wage, price, inflation problem. Another group of observers sees the wage-price issue from the point of view of consumption and its significance to the level of economic activity achieved nationally.

The position taken is that wages must increase at least as fast as productivity increases or else goods and services cannot be bought by wage-earner consumers. As argued by the AFL-CIO, wages and salaries must increase each year along with the improvements which occur in productivity, for only in this way can markets be provided for the increased output.¹¹

A more extreme point of view is taken in a study directed by Leon Keyserling, who argues that wages must lead productivity gains.¹² In January, 1958 (when the study was published), the

¹⁰ Roger M. Blough, Chairman, United States Steel Corporation, Year-End Statement, December, 1958.

¹¹ AFL-CIO, *Labor's Economic Review*, Vol. 3, November, 1958, pp. 65-72.

¹² Keyserling, a former chairman of the President's Council of Economic Advisors, presents this analysis in *Wages and the Public Interest*. The publication was prepared in January, 1958, for the Conference on Economic Progress, a private organization which includes on its national committee Walter Reuther of the United Automobile Workers; O. A. Knight of the Oil, Chemical and Atomic Workers; and Al J. Hayes of the International Association of Machinists.

economy was running short of full production. Mr. Keyserling maintained at that time that too much money was going into increasing production and not into increasing wages and therefore consumption. He argued that wages should increase faster than profits, for increased incomes on the part of wage earners would permit them to buy the products of American enterprise. He called for a drop in prices and an increase in wages, especially as he felt that wages had not kept up with profits.

This position was restated in July, 1959, in another study directed by Mr. Keyserling.¹⁸ The views presented, however, overlook the fact that profits represent purchasing power just as wages do. Profits determine in part the amount of capital available for investment. This in turn leads to greater expenditures which create opportunities for work, thereby providing wages.

RECENT DEVELOPMENTS

Particularly important for this discussion are several significant developments which have occurred recently.

First, President Eisenhower, in his 1957 Economic Report, asked for agreements on wages between labor and management which would be "consistent with productivity prospects and with the maintenance of a stable dollar." There is some question whether demands for wages have always been consistent with productivity prospects, and, in fact, there are many indications that some wage settlements have been inflationary.

Second, in 1959, the President set up the Cabinet Committee on Price Stability for Economic Growth, under the chairmanship of Vice President Nixon, to look into productivity as it influences inflation. The first report of the Committee, issued late in June, 1959, outlines several areas in which the Committee will conduct its work on problems of inflation. In its report, the Committee states that deferred increases and recent wage settlements—as well as those which may occur in major industries negotiating contracts throughout the remainder of the year—" . . . could result in wage increases of such magnitude as to lead to price increases." There have been mixed reactions to the Committee's report, and

¹⁸ Conference on Economic Progress (Washington), *Inflation—Cause and Cure*, July, 1959, 59 pp.

the nature of these indicates that although the Committee is interested primarily in the broadest possible analysis of the national problem of continuing inflation, its work will stimulate continued controversy on the issue of wages and productivity.¹⁴

Third, the Joint Economic Committee under the chairmanship of Senator Paul H. Douglas, an economist, is presently undertaking a study of the effect of wages on prices, profits and inflation. The Senate Subcommittee on Antitrust and Monopoly undoubtedly will also continue to be concerned with these matters.

Fourth, during a recent session of Congress a bill was introduced by Representative Henry S. Reuss to amend the Employment Act of 1946 to give the President broad discretionary powers to hold public hearings on prices and wages that appear to him to threaten economic stability. This is representative of the thinking of some who believe that the federal government must be more closely concerned with wage and price movements in the economy.

UNION STRATEGY

Union interest in relating wage increases to productivity increases, expressed in terms of output per man-hour, derives from a time when there seemed to be a clear relationship between worker effort and increases in output. In today's industrial operations, however, improving technology and the availability of cheap sources of energy, both resting on the enormous investments made in plant and equipment by business firms and government, have meant that physical effort has been reduced, especially in arduous, repetitive factory tasks, while productivity has increased.

Because of the vast changes in the nature of the productive activities of the nation, unions have found less advantage in arguing that wage increases should be based on increased effort of labor in producing higher output. Today, especially as the concept of productivity is more clearly understood, their more usual position is simply that labor must be rewarded when productivity

¹⁴ The Committee's report was commented on by Leon H. Keyserling in *Inflation—Cause and Cure*. He repeated his argument that wage increases can lead to an expansion of demand by consumers and that this is advantageous for the nation. He argues that such increases are not inflationary. He bases this on his observation that there had not been an excess of consumer demand during the recent period of inflation which could have caused the price increases that were experienced, nor did demand exceed our productive capabilities.

increases are achieved. It is held that disequilibrium will occur in the economy when workers, who are consumers, do not receive money incomes presumed to be sufficient to buy the increased volume of goods and services available as a result of higher productivity. There has been some public appeal to this argument—particularly because it has been presented effectively, and because the answer to it involves a discussion so technical as to make public refutation difficult. Moreover, the repetitive use of the term “labor productivity” has come to imply that increased output is the result of labor effort and therefore any gains belong to labor.

THE OPPOSING POSITIONS OF LABOR AND MANAGEMENT

With relationships between wages and prices in a period of inflation attracting public attention, and with the process of wage determination coming under scrutiny, fairly set positions on productivity and its relationships to wages have been assumed by labor on the one hand and management on the other. Unions have emphasized the significance of consumption. According to one line of reasoning, wages must match productivity gains, or, according to the Keyserling argument, they should lead productivity. Conversely, management has taken the position that if inflation is to be avoided, a balanced relationship must exist among wages and other employment costs, prices, and profits; otherwise, if wages rise too fast, prices must increase or the dangers of a “cost-push” inflation will have to be faced.

The positions of labor and management are most meaningful not only when viewed in terms of the interrelationships between (1) wages and other costs of employment, (2) prices, and (3) productivity, but also when account is taken of (4) the collective bargaining process. These interrelationships are further affected by (5) the nature of the national debate on economic matters, which influences the setting in which the first four factors are interacting, and (6) labor-management relations within a particular industry, or pattern-setting bargaining in major industrial sectors of the economy, both of which have a direct bearing on the collective bargaining process.

Thus, the issue of productivity is intertwined in a most complicated manner with national economic policy, a company's wage

policy, the price structure, the nature of labor and management relations and a union's bargaining policy. It is not surprising, therefore, that discussions over wages, prices, and productivity have aired a broad range of points of view. Out of them has come an increased understanding of the influence on the total economy of employers' decisions on wages as affected by collective bargaining. This has led some to be interested in relating wage policies, which have typically rested on a power relationship in major industries between labor and management, to a formula-type approach to wage determination. Those who propose such an approach argue that it would introduce system and order into wage determination and remove wages from the vagaries of the collective bargaining process. The implications of this argument are reviewed below.

IMPACT OF PRODUCTIVITY ON LABOR RELATIONS

As a factor to consider in negotiations, labor productivity, as a matter of theory, received recognition by Sumner Slichter in 1947;¹⁵ as a matter of practice, national productivity seemed to be acknowledged in the automobile company agreements negotiated in 1948. Despite this early recognition, however, productivity has not had a direct and substantial bearing on the collective bargaining process nor on the arbitration process. The following discussion presents the issues and developments.

INFLUENCE OF THE ECONOMIC SETTING ON UNION DEMANDS

As a matter of tactics, general conditions in the economy have a bearing on whether a union is likely to raise the productivity issue in collective bargaining. If conditions are good and the business cycle is on the upswing, unions believe that employers may be more willing to make wage adjustments than if business conditions are poor or expectations are poor. Normally, during the early phase of the upswing of the business cycle, increases in wages, as considered from the point of view of the total economy, may be offset by more satisfactory output patterns and greater demand. Moreover, if

¹⁵ *Basic Criteria Used in Wage Negotiations*, Chicago Association of Commerce and Industry, January, 1947, 56 pp.

prices are to be raised, they are more easily absorbed at this stage of the cycle. But where wage increases occur at the high point of the cycle, it is difficult for a company to adjust to the higher rates of pay, because productivity is not increasing as rapidly and because price increases are more strongly resisted. Under these conditions wage increases can be especially dangerous.

From a union's point of view, practical and strategic considerations are involved in determining the vigor with which the relating of productivity to wages will be pressed. The idea that wages should at least keep pace with changes in the cost of living or with consumer prices is only effective as a wage-increasing mechanism if prices are increasing. During periods of relatively stable prices comparisons between wages and the Consumer Price Index are not favorable ones. This is the time when the productivity argument may be presented by a union in order to show its wage demands in a more favorable light.

RELATING WAGES TO PRODUCTIVITY THROUGH NEGOTIATIONS

Because of the several difficulties in measuring productivity and the shortcomings of available productivity data, as discussed earlier, the use of productivity data in wage determination at an individual plant or even for an industry is questionable, for the reasons summarized below:

1. The relative contributions to productivity change by each of the factors of production cannot be measured with any degree of precision either for the nation or for a company.
2. The quantification of input and output is difficult—especially at the company level—and the period over which productivity is to be viewed has a bearing on the apparent changes in the data.
3. It is nearly impossible to obtain an accepted measure of productivity change—either for the nation or for a company—or to gain agreement on a definition of productivity.
4. If productivity increases for the nation, and this is reflected in wages in a successful company or industry, such increases would tend to be pattern-setting. This would mean that wages in the less successful companies would rise and prices would increase. Where productivity gains are not paralleling those in pattern-setting indus-

tries, these inevitable wage and price increases would result in severe inflationary pressures.

5. Wage-rate patterns and the wage-rate structure in a community would be destroyed if in a single high-productivity firm wages were related to output patterns. Such a relation could have an inflationary effect also as other firms in the area are forced to meet higher wage levels and subsequently raise their prices.

6. If productivity changes are followed rigidly in wage determination, wages would move both up and down in response to these changes.

7. Productivity measurement is designed to show changes over past periods and cannot foretell future trends, whereas wages are negotiated to commit the company to future payments.

8. There is a conflict between company profitability, which determines a firm's ability to pay higher wages, and national productivity patterns, which determine the general standard of living. To the extent that we follow an economic system that rests on the decisions made in the individual business firm, which lead to the improvements in national productivity, we cannot follow a pattern of setting wages based on national output trends.

LONG-TERM CONTRACTS

Some observers feel that any long-term contract providing for annual increases in wages is, in effect, a recognition by an employer of improving over-all efficiency which can be reflected in some sort of wage or employment cost increase in future periods. It is argued, therefore, that despite the name given to deferred increases, where they exist there is a trend toward the acceptance of productivity change as a factor in determining wages through collective bargaining, even though it is not so expressed in current agreements. This position is supported by reference to one study which shows that almost a third of the collective bargaining agreements studied provide for deferred increases in wages.¹⁶ It is primarily in the automobile industry, however, that these long-term contracts contain the phrase, "annual improvement factor."

¹⁶ Bureau of National Affairs, Inc. (Washington), "Basic Patterns in Union Contracts" in *Collective Bargaining Negotiations and Contracts*, Fourth Edition, October, 1957, pp. 36:1-36:2.

Actually, the number of long-term contracts apparently is stabilizing. In fact, there are some managements who have reversed their earlier thinking and now believe that wages should be set annually rather than for longer periods. They regard this as the only sensible approach to wage determination, believing that meaningful and intelligent projections of costs, market conditions, and wages cannot be made for periods much longer than a year. These employers believe strongly that wages should be determined by actual market forces and improvements in technology rather than long-term guesses on the future long-run movements of the economy as a whole. Moreover, the inflationary effect of automatic wage adjustments has come to be more clearly understood, as has the bargaining posture assumed by those union leaders with contracts having long-term wage adjustments who seem to ask "what have you done for me lately."¹⁷

SIGNIFICANT EXPERIENCE IN RELATING PAY CHANGES TO PRODUCTIVITY

While the productivity of the *firm* has not figured in the direct determination of wage changes in American industry, many students feel that relationships between national productivity, expressed as output per man-hour, and wages were established in a significant industry when the General Motors Corporation negotiated its contract with the United Automobile Workers in 1948.¹⁸ That contract appeared to recognize increasing national productivity in terms of output per man-hour in determining wage levels through the establishment of an annual improvement factor.¹⁹

What were the conditions in the automobile industry which permitted the acceptance of an approach that related wages to an

¹⁷ Joseph W. Garbarino, "The Economic Significance of Automatic Wage Adjustments," in *New Dimensions in Collective Bargaining*, New York: Harper & Brothers, 1959, p. 171.

¹⁸ General Motors-UAW contracts have provided for increases as follows: 1948—3 cents per hour, considered equivalent to about a 2 percent increase in productivity for the nation; 1950—4 cents; later 5 cents; an assumed productivity increase of 2.5 percent; 1955—a minimum of 6 cents or an assumed productivity increase of 3 percent. The most recent agreement in the industry provides for increases in 1958, 1959 and 1960, of 2½ percent over each employee's straight-time hourly rate, or 6 cents an hour, whichever is greater.

¹⁹ Wilson, C. E., *Fair Wages and Economic Stability*, Address at Michigan State College, October 17, 1951. See also his speech, "Productivity—The Key to Progress," given at Wharton School of Finance, November, 1950.

assumed increase in national productivity? First, the automobile industry has been a highly profitable one which has been able to increase output per man-hour by introducing new methods of operation. General Motors, therefore, because it could improve its own efficiency, probably felt justified in assuming that it could increase wages according to what it considered to be the *long-run* national increase in productivity. Second, because sales have been high and competition in the industry is keen, the company undoubtedly has been interested in securing agreements without suffering the disrupting effect of strikes. Third, the company is in a position to modify methods without interference from the union because it retained prerogatives in its agreements which permit it to take broad action in changing production operations. These are in the form of a contract clause calling for union co-operation in achieving greater efficiency.

As noted, the General Motors Corporation agreement with the United Automobile Workers in 1948 served as a pattern for the major employers in the industry. The contract provided deferred increases and secured a long-term agreement during a period when business was expected to be good. National productivity seemed to be the rationalization rather than the reason for the increase. In referring to the clauses in the contract relating to the annual improvement factor, the company explained that this factor, plus cost-of-living allowances, "enables employees in the United States to improve their standard of living in line with the long-term technological progress of the country."²⁰

The approach of the automobile industry has not been pattern-setting for other industries (as already mentioned, it has been estimated that only one-third of the contracts provide for some form of deferred increase, with the annual improvement factor as one of several types of provisions), and there have been frequent criticisms of it. It is argued that the annual improvement factor has no real relationship to productivity but is merely another component of wages and salaries over which a company must negotiate. According to this view, the effect of the clauses in the automobile industry contracts is merely to disguise wage increases in a new and different wrapper.

²⁰ General Motors Corporation, *Shareholders' Quarterly*, June 30, 1959, p. 2.

THE PRODUCTIVITY ISSUE IN ARBITRATION

In a comprehensive review of arbitration cases, published in 1954, the author of the study indicates that arbitrators were not presented with cases involving productivity, and also that they were not inclined to use the productivity argument in making their determinations.²¹ His observations are interesting.

One may conclude that productivity as a wage-determining standard leaves something to be desired on grounds of precision. The fact that the expert has hesitated to place his foot in the quicksand, however, has not invariably deterred the innocent.

. . . the productivity criterion has hardly penetrated the crust of wage arbitration. Only 2.4 percent of the citations in our sample were related to this factor, and arbitrators never gave it decisive weight. Emergency boards and arbitrators in the railroad industry before 1953 appear to have been no more impressed with the productivity argument.

This arbitral abstemiousness stems from the unusual difficulties that obstruct the application of this criterion to the cases. The statistical manipulations that go on, though impressive for their quantity and ingenuity, are not marked for their translatability into cents per hour.

There is no indication that these findings would have to be modified by more recent experience.

USING WAGE INCREASES TO FACILITATE TECHNOLOGICAL CHANGE

There are some who believe that the application of the productivity concept to wage determination is appropriate if a company wants to introduce technological improvements that would otherwise be resisted by a union or by employees. It is held that pay increases stemming from such improvements force a union to view technological changes more favorably and to accept them more readily, even though it might mean a reduction in work opportunities. There is some question, however, as to whether a union's acceptance of technological change should be obtained in this way. Since

²¹ Irving Bernstein, *Arbitration of Wages*, Berkeley, California: University of California Press, 1954, p. 98.

technological change derives primarily from substantial capital investments and is based on the achievements of many and not those of labor alone, gaining acceptance of a change may not reward the right group, at the right time. Moreover, it may distort the wage structure and wage relationships and introduce a cost factor that bears no relationship to the future output patterns of the company. The comments of Theodore O. Yntema of the Ford Motor Company reported in the next section are interesting in this connection.

TWO WAYS OF VIEWING PRODUCTIVITY AS A WAGE DETERMINANT

A union's use of the productivity argument in contract negotiations will vary with the times, as indicated in an article in *Labor's Economic Review*,²² in which the union states that productivity is one of several factors in any negotiation between a union and an employer. One significant factor is cost of living; another is the profits of the employer and the industry. The union asserts that it is the right of wage and salary earners to share in the profitability "of their employer and industry and in the benefits of the economies of rising productivity." The union's position is one of flexibility, for there is not *one* factor to be considered in negotiations, but many. This is reflected by experience: unions choose the bargaining position that is most favorable to them in the light of conditions at the time of bargaining. Moreover, the type of productivity figure selected is also based on its relative advantage as a bargaining tool.

A company which recognizes, in its collective bargaining agreement, that it must reward individuals on the basis of productivity increases has problems too. Referring again to the statement of Theodore O. Yntema before the Senate Antitrust and Monopoly Subcommittee, he reported that increased productivity in Ford Motor Company was accomplished through the efforts of all employees—scientists, engineers, managers, investors, and hourly workers—but that the hourly workers constitute a minor source of increased productivity.²³ Mr. Yntema cited the contract of his company with the United Automobile Workers as supporting his contention. The

²² AFL-CIO, *op. cit.*, pp. 65-72.

²³ See footnote 8.

contract language is that "... a continuing improvement in the standard of living of employees depends upon technological progress, better tools, methods, processes and equipment, and a co-operative attitude on the part of all parties in such progress. ... to produce more with the same amount of human effort is a sound economic and social objective."

Despite this clause, Mr. Yntema says, "The fact of the matter is that unions frequently have impeded productivity advances by featherbedding, slowdowns, and other restrictive practices, and by opposing or penalizing the introduction of new processes."²⁴

CONCLUDING COMMENTS ON PRODUCTIVITY AND WAGES

National increases in productivity must result in one or a combination of the following: (1) an increase in wages, (2) an increase in profits, (3) a decrease in prices. There is some reason to believe that there should be some balance in the movement of wages, prices, and profits based on the relative contributions made to increases in productivity and the condition of the economy. Additionally, consideration should be given to whether wage earners or shareholders gain an unfair advantage and disturb any existing economic stability or balance. It would appear on the surface that over the last several decades no general decrease in prices has occurred. Undoubtedly, there have been price decreases, but they have been obscured by concurrent improvements in quality. Price increases and inflation have distorted the picture of improvement that has occurred in a majority of the products produced and consumed in the United States.

Setting aside the claims and counterclaims, what has been the bearing of productivity increases achieved nationally on the hourly earnings of wage earners? Solomon Fabricant reports: "Real earnings per hour of work in the private domestic economy rose over the period since 1889 at an average annual rate *about equal to the rate of increase in product per manhour, and greater than the rate of increase in product per weighted unit of labor and capital combined.*"²⁵ (Italics ours.)

²⁴ See footnote 8.

²⁵ Fabricant, *op. cit.*, p. 29.

It would appear, therefore, that the usual and traditional processes followed in determining wages in the thousands of employment situations throughout the nation have operated in such a way as to *distribute the nation's gains in productivity to wage earners not only in proportion to increases which have been achieved for the entire nation but even in excess of that. One of the primary causes of this achievement has been the process of wage determination as practiced unilaterally by companies and collectively with unions in the give-and-take of the bargaining process.* Proposing to subject wage determination to any productivity index may distort the success actually achieved in relating earnings to productivity and thereby have a serious effect on the total economy. Where productivity measures are used, they must be broad measures which embrace all factors of production; these can be valuable in assisting policy makers in arriving at more realistic decisions on wages so that a company's compensation practices act neither to deflate nor inflate the economy.

Conclusions

The over-all dilemma in dealing with the subject of productivity is that so much discussion has occurred and so many claims have been made that it is difficult to know what the statistics mean or imply. The purpose of this discussion has been to provide a setting for considering the national issues arising out of the proposed uses of productivity data. This has necessitated a review of the many problems encountered in measuring productivity and of the distinctions between productivity measurement at the national and company level. A thorough understanding of productivity measurement is necessary in order to consider the data intelligently.

ATTRACTIVENESS OF PRODUCTIVITY AS A WAGE DETERMINANT

Unfortunately, there is an attractiveness about using productivity data to determine wage changes. For a union it offers a tactical and publicly appealing argument when prices are stable; for policy makers, especially in government, it offers the possibility of providing a means of avoiding major national strikes over wages which, although relatively infrequent, are considered the pitfalls of the collective bargaining process.

While it would be nice to be able to resolve sticky questions of wage determination in a more or less mechanical fashion, where productivity change has been used it has not been a panacea. The available data are far from sufficient to permit a rigid relationship to be established between wages and productivity. Available studies seem to indicate that even without government intervention or the mechanical tying of wages to productivity, wages have actually exceeded long-run national productivity increases.

SHORTCOMINGS AND POSSIBLE APPLICATION OF PRODUCTIVITY DATA

In order to judge the general trends of wages and salaries within a company or in the economy, it is possible to evaluate the company

or the national wage picture in terms of achievements in national productivity. In this light, productivity is an indicator, rather than a determinant, which can be used by management and others in the evaluation of trends and movements that have occurred in wages and salaries, prices and output patterns. Such an indicator, while valuable and useful, is no more precise for the nation or company than indexes of production, inventory, turnover, value added, etc. No one of these can be used in any given situation to determine, finally and precisely, the course of a business or the specific reward to a single factor of production.

Experience shows that the use of any index as a determinant of wages does nothing more than to introduce a base on top of which further increases will be demanded in negotiations. To the extent that proposals to relate wages to productivity do not consider all costs of employment—pensions, insurance, holidays, etc.—they are totally unrealistic, for these costs have a substantial bearing on the total wage bill. In addition, since no formula tied to an index (which may drop) can guarantee a wage increase each year, an index is acceptable to a union only when it is increasing. This is as true of productivity as it is of cost-of-living increases based on a consumers' price index.

OVER-ALL CAUTIONS

The tendency to engage in national debates on economic matters throws the spotlight on relationships between wages, prices, and productivity. Arising out of these debates is the suggestion of using productivity as a wage determinant. The suggestion itself diffuses the impact of the bargaining process on the parties in negotiations. It also must lead inevitably to pressure for the establishment of an administrative process to determine wages by government action. Despite the shortcomings of such an approach to wage determination, which are apparent to many, there seems to be a growing group which believes that productivity provides a device capable of overcoming all difficulties in wage determination. But the very nature of the data emphasizes the need for full understanding of them, especially because they cannot serve as a basis for a systematic, scientific formula for wage determination. The reasons for this are as follows:

1. Productivity data in themselves contain many shortcomings: they do not reflect quality change; they do not adequately take account of changes in price; and they do not take into account changes in the nature of output.

2. It is difficult to use available data because of the lack of agreement on many assumptions on which the data rest, particularly with respect to national or company-wide measures, long- or short-run measures or the method of deriving the rate of change.

3. The data do not take into account long-run structural changes in the economy in terms of the changes in rural-urban patterns, in skill utilization, in the level and extent of application of technology, and in the relative and growing significance of governmental activities.

4. If productivity increases are to be distributed to those who contribute to such increases, it is necessary to determine relative contributions. How is this to be done for the stockholder, the manager, the engineer, the mechanic, or the laborer? Moreover, what part of the increase is truly the result of over-all community improvements—better schools, better roads, better hospitals, etc.?

5. If productivity is to be the sole or major criterion in determining payments of wages, salaries and other employment costs to those in high productivity industries, this could mean that the service worker—the doctor, lawyer, or barber—or even the pensioner, will not share in the increases. Productivity in the services is not increasing at a rate comparable to the rate of increase in industrial employment.

6. In collective bargaining, the productivity argument is introduced by unions when it helps rationalize demands for wage increases. Where increases based on productivity change are granted, they tend to be disguised wage increases, and they become a minimum beyond which further adjustments are demanded. It is the internal political situation within a union and the dynamics of the bargaining process that impose on a union the obligation of demanding and trying to get more each year in wages than employers are willing to pay. Realistically speaking, therefore, if wages are tied to a long-range rate of productivity change, the amount

will be taken for granted and will set the beginning point for negotiations over wages. Thus, the tying of a part of wages or the entire wage structure to productivity change must inevitably be inflationary.

Undoubtedly, the many national observers and commentators are sincere in their efforts and interest in establishing an approach to wage determination that would provide automatic relationships between wages and conditions in the economy. It is questionable, however, that the means to forge such a relationship is available in such precise terms as to permit wage determination to be accomplished by reference to productivity data. That such a relationship should be considered possible is untenable in the light of *present* knowledge and understanding of the data. It is possible that a means to establish such a relationship may emerge from extended researches into productivity statistics and the causes of productivity change resting as it does on all factors of production, provided agreement can be reached on the assumptions which must continue to be made for any productivity measurement program. As this is not likely, productivity data must inevitably come to be restricted to use by the economist in considering trends in output and in appraising the achievements of a company or of the economic system; but they cannot be used arbitrarily and sensibly in making decisions on wages and prices.

APPENDICES

APPENDIX A

INDEXES OF REAL PRODUCT PER MAN HOUR FOR THE
PRIVATE ECONOMY, 1947-1968
(1947-49 = 100)

Year	Man-hour Estimates Based Primarily on Data From:							
	Bureau of Labor Statistics					Bureau of the Census		
	Total	Agri- culture	Nonagricultural Industries			Total	Agri- culture	Nonagri- cultural Industries
			Total	Manu- facturing	Nonmanu- facturing			
1947	96.7	90.5	97.5	97.6	97.3	97.4	90.6	98.4
1948	100.2	107.1	99.4	100.1	98.9	100.3	107.5	99.4
1949	103.1	102.2	103.3	102.6	103.9	102.2	101.6	102.4
1950	110.4	116.2	108.8	109.5	108.4	110.3	116.1	108.5
1951	113.2	114.6	110.6	111.2	110.0	115.2	114.1	112.8
1952	115.7	124.5	112.0	113.0	111.3	118.9	124.0	115.5
1953	120.4	138.6	115.1	118.3	112.8	123.9	138.0	119.0
1954	122.6	148.3	116.9	117.4	116.7	127.0	147.9	121.8
1955	128.0	153.3	121.9	125.6	120.0	133.1	152.9	127.5
1956	128.8	160.7	121.8	127.1	119.1	134.2	160.2	127.7
1957	132.3	168.6	124.4	127.7	122.9	137.8	168.6	130.0
1958 *	133.4	190.1	124.3	^b	^b	137.6	190.1	128.6

* Preliminary, subject to revision.

^b Not available.

Note: The indexes in this table were computed by the Department of Labor, Bureau of Labor Statistics, from estimates of real product and man-hours. The real product estimates, referring to 1954 prices, are based primarily on national product statistics of the Department of Commerce, Office of Business Economics, except for the manufacturing real product estimates which were developed by the Bureau of Labor Statistics.

Output per man-hour estimates based primarily on Bureau of Labor Statistics man-hour data relate, in concept, to man-hours paid whereas estimates based primarily on Bureau of the Census labor force data relate, in concept, to hours worked. The former include, the latter exclude, paid vacations, sick leave and holidays. The difference between the two measures may, however, be due in part to statistical as well as conceptual differences. Both sets of man-hour estimates cover the man-hours of wage and salary workers, self-employed and unpaid family workers.

Concepts, methods, and sources are described in a forthcoming BLS report, "Postwar Trends in Output Per Man-Hour, Total Private Economy and Major Sectors."

Source: Ewan Clague, Commissioner of Labor Statistics, *Prices, Wages and Productivity*, Speech Before the Labor Relations and Arbitration Conference, University of California, San Francisco, May 25, 1959, 31 pp.

APPENDIX B

DEFINITION OF SELECTED TERMS

Gross National Product (GNP): A measure of the market value of the goods and services produced in the economy. GNP estimates are prepared by the National Income Division of the Office of Business Economics, United States Department of Commerce, and are so constructed as to eliminate intermediate products and double counting, but they include the value of capital goods that are used in the production of the nation's goods and services. GNP is expressed in dollars and therefore is a function of the price level as well as the volume of goods and services produced. Since the estimates are expressed in terms of current dollars, the effect of price changes must be eliminated for productivity measurement, in order to highlight the changes in output rather than in price. This is done by converting all values to constant prices.

Input: One or a combination of factors of production. In the productivity ratio an input which can be quantified, such as labor (see "Man-hours" below), is used, although it would be most desirable, if possible, to quantify and combine all inputs, including capital, in order to derive "total factor productivity."

Labor Productivity: (See "Output per Man-hour")

Man-hours: In national productivity measurement programs, two estimates of man-hours are available. One is prepared by the United States Bureau of the Census and generally tends to cover hours worked; the other, based on United States Bureau of Labor Statistics data, generally tends to cover hours paid. The BLS data have assumed extra significance because such employee benefits as paid sick leave, vacations, holidays, etc., have become such a large part of total labor cost. Since hours paid are greater than hours worked, a productivity ratio based on hours paid as an input factor would be lower than a ratio based on hours worked.

Output: The final result of a productive activity resulting in goods and/or services that have market value. Output does not have to be consumed to be included in the productivity ratio, as productivity measurement is designed to relate input to the total output of a period, whether it is consumed or not.

Output Per Man-hour: The ratio of output (usually expressed in

terms of the value of goods and services produced) to labor time spent in producing that output. The use of labor as an input involves many problems of quantification but is usually justified on the basis that labor is common to all production and that despite the problems involved, it is still the most easily quantified input. However, the use of labor as input does not mean that increases or decreases in productivity are the result of the contribution of labor. Moreover, while a rough estimate can be made of the labor input factor in terms of hours worked, there are differences in the quality and skills of labor as well as in the quantity of work performed. Shifts in skill utilization or changes in methods of production are only reflected as the total hours of the labor input factor decrease proportionate to output. (See Man-hours.)

Productivity: A guide to economic efficiency. It is the ratio of output (most usually expressed as the value of goods and services produced) to input contributing to that output at any level of productive activity (the plant, the company, the industry, the nation).

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