

PRODUCTIVITY, EMPLOYMENT, AND LIVING STANDARDS

Statement by Ewan Clague, Commissioner of Labor Statistics,  
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before the Conference on Productivity  
University of Wisconsin Industrial Relations Center  
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It is no secret that the United States enjoys the highest standard of living in the world. It may not be generally realized that, in large measure, the high living standard in the United States is the direct result of higher productivity. Productivity levels in the United States are more than twice those in Great Britain, and recent figures indicate that our productivity is more than three times that of Belgium, France and other industrial countries of Europe. Furthermore, there is good reason to believe that the spread between productivity levels here and abroad has been increasing over the past few decades. We have increased our lead by continual improvements in machinery, improvements in production techniques and through continued acceptance and application of new ideas by both management and labor. At the same time, we have reduced the length of the work week so that American workers enjoy a greater amount of leisure time than workers in many other countries. The questions we must ask ourselves today are: How have we achieved our lead in productivity and living standards? Will we be able to maintain the lead? Need we fear technological unemployment which might result from productivity advances?

These questions and their answers are of paramount importance to us at the present moment. We have just emerged from an eight-year period of war and postwar readjustment which has had a profound effect on our productivity. In the past, productivity has increased at such a steady rate, that many of us have come to accept productivity advances as a matter requiring little attention. We have tended to expect advances to occur as a by-product of normal business activities.

The cost of the war in terms of its impact on industrial efficiency has been serious. Although a number of industries made remarkable gains in productivity during the war, many industries have been unable to maintain their prewar rate of advance. It has become apparent that we can no longer rely on seemingly automatic advances in productivity. We must make conscious effort to increase levels of productivity. It will require a broad understanding of productivity and a high degree of cooperation to maintain our lead in industry. Let us consider some aspects of productivity and review how we have achieved our past gains.

"Productivity" is a word which we use broadly to express the overall efficiency with which our industries perform. We in the United States have always placed a high premium on efficiency. It is an interesting parallel that together with our interest in industrial efficiency has gone an interest in productivity statistics. As long ago as 1890, pioneering work in productivity measurement was begun, and the United States has devoted more thought to the development of information in this field than has any other country. During the past two years a number of European nations have become

vitaly interested in productivity and are taking steps to improve the industrial efficiency of their industry. They have become convinced that continuation of customary methods of production is insufficient for their postwar recovery, and that only through increased productivity can the total volume of production be restored and the living standards of their people improved. As the need to raise productivity levels becomes evident, the need for information about productivity becomes apparent.

Economists and business leaders for several decades have used the term productivity to refer to the production obtained from a given amount of labor. "Productivity," as I use it here in this discussion, is employed in this manner and means output per worker or per man-hour--the physical volume of production attained per worker or per man-hour. In a sense this definite meaning of the term "productivity" represents an agreement among many groups reached over many years of attempting to measure a complex field of industrial experience. Many management and labor leaders have, in addition, developed and used other measures of productivity which fit their particular needs and have special applications. These other measures and other definitions are no doubt equally correct, although each measure has a different application in practice. I will confine my remarks, however, to the more widely used definition.

Productivity in any industry refers to the over-all net yield of goods or services per man-hour, as it is affected by all the diverse influences at work in an industry. This yield of production is affected by changing industrial methods, by the introduction of new machinery or the increasing rate of obsolescence of old equipment, by the flow of materials or its interruption, by introduction of new products, by changes in the proportion of total capacity utilized, by the relations of manufacturers with their sub-contractors, by the skill, training, efficiency, and effort of both workers and management and by the state of labor relations. Thus, for example, the production of shoes per man-hour tends to increase with the introduction of new factory methods and machinery. In this industry output per man-hour increased during the war as a result (in part) of simplification of style and production of large quantities of standard design for military requirements. Even though the industry was plagued by difficulties in obtaining adequate supplies of leather and with labor shortages and high employment turnover, the favorable factors outweighed the unfavorable. With a postwar return to improved quality and multiplicity of styles, productivity dropped despite improvement in the raw-material supply situation. In 1948 preliminary figures show a moderate increase of 2 percent in man-hour output over the 1947 level.

No one statistic or method of computation can provide a completely satisfactory measure of productivity which would be useful in all situations. Some statistics are suitable for use in measuring the output per man-hour on particular jobs or operations in individual plants. Other measures provide over-all figures for specific products of any industry, or for all production combined. It is likely that one reason for so much discussion over productivity originates in the conflicting desires of interested parties, each of whom is striving to measure something different. The Bureau of Labor

Statistics, as you know, prepares industry-wide statistics which show the trend for entire industries. For some industries we have been able to compute indexes from published data on production and man-hours released by government agencies and trade associations; in other cases, we have instituted a reporting program whereby productivity information is furnished to the Bureau by individual plants.

While the productivity measures prepared by plant managers for their own use are of vital concern to them in controlling productive efficiency, it is the broader industry-wide measures which provide a key to the industrial efficiency of the whole economy. These statistics are of particular interest in discussions such as this, which pertain to employment and the standard of living.

It is not possible to measure, with a high degree of accuracy, the American standard of living. It is possible to obtain some general idea of our achievement in attaining a high level of living by observing the trend of gross national product (in constant dollars) per capita. Gross national product is defined by the Department of Commerce, as "the market value of the output of goods and services produced by the Nation's economy, before deduction of depreciation charges and other allowances for business and institutional consumption of durable capital goods" . . . When adjusted for price changes, then, real gross national product approximates some physical measure of total material output. According to estimates made in January 1949, "real" gross national product per capita (valued at 1944 price levels) increased 200 percent from 1889 to 1947. In each decade, with two exceptions, the increases have been in the neighborhood of 20 to 25 percent; in the decade 1929-39 a 3 percent decline occurred, followed by a 47 percent increase in the following 8 years.

It should be remembered, of course, that an increased amount of leisure time contributes to our standard of living, and this is not measured by gross national product per capita. To the extent that a reduction in the work week is desired and does not represent partial unemployment, a short work week represents acceptance of more leisure in place of additional goods and services.

If we define the material standard of living as total production per capita, it follows that increases in the living standard come about almost exclusively as a result of (1) increases in the proportion of the employed work force, (2) increases in the length of the average work week, and (3) increased output per man-hour. Over the past half-century the proportion of total population in the labor force has varied within narrow limits. During the same period, with the exception of the war years, there has been a downward trend in the length of the work week. Even without a measure of productivity, therefore, it could be assumed with reasonable safety that output per man-hour has risen generally. The relationship between the length of the work week, the standard of living and productivity is also of importance. If instead of shortening the length of the work week, we had continued to work longer hours, total production would have been greater. Instead we chose to take our

standard of living increases in two forms: (1) an increased material level of living and (2) increased leisure. As an aside, I should add that one reason for a high level of output per man-hour is the shorter work week. Exceedingly long hours of work affect human efficiency and lower output per man-hour results.

The accompanying Chart 1 based on Bureau indexes shows that, for manufacturing industries as a whole, output per man-hour has risen at the average rate of about 3 percent a year from 1909-1939, doubling in a period of a little over 20 years. The rate of increase in mining and railroad transportation has been similar to that of manufacturing; the rate in electric power production has been higher; in agriculture, lower.

This trend line showing the rise in output per man-hour in all manufacturing aids us in analyzing the underlying causes of increases in our standard of living, but examination of such an over-all average obscures the underlying movements of productivity which have taken place in individual industries and products. The average productivity trend line indicated on the chart, shows the net effect of numerous diverse changes within the individual industries. In rayon yarn manufacturing--an example of a relatively new industry--output per man-hour has increased with great rapidity, increasing 300 percent from 1923 to 1939 and more than doubling from 1939 to 1948. Man-hour output in an established industry like leather manufacture doubled between 1919 and 1939 but rose only 20 percent from 1939 to 1947.

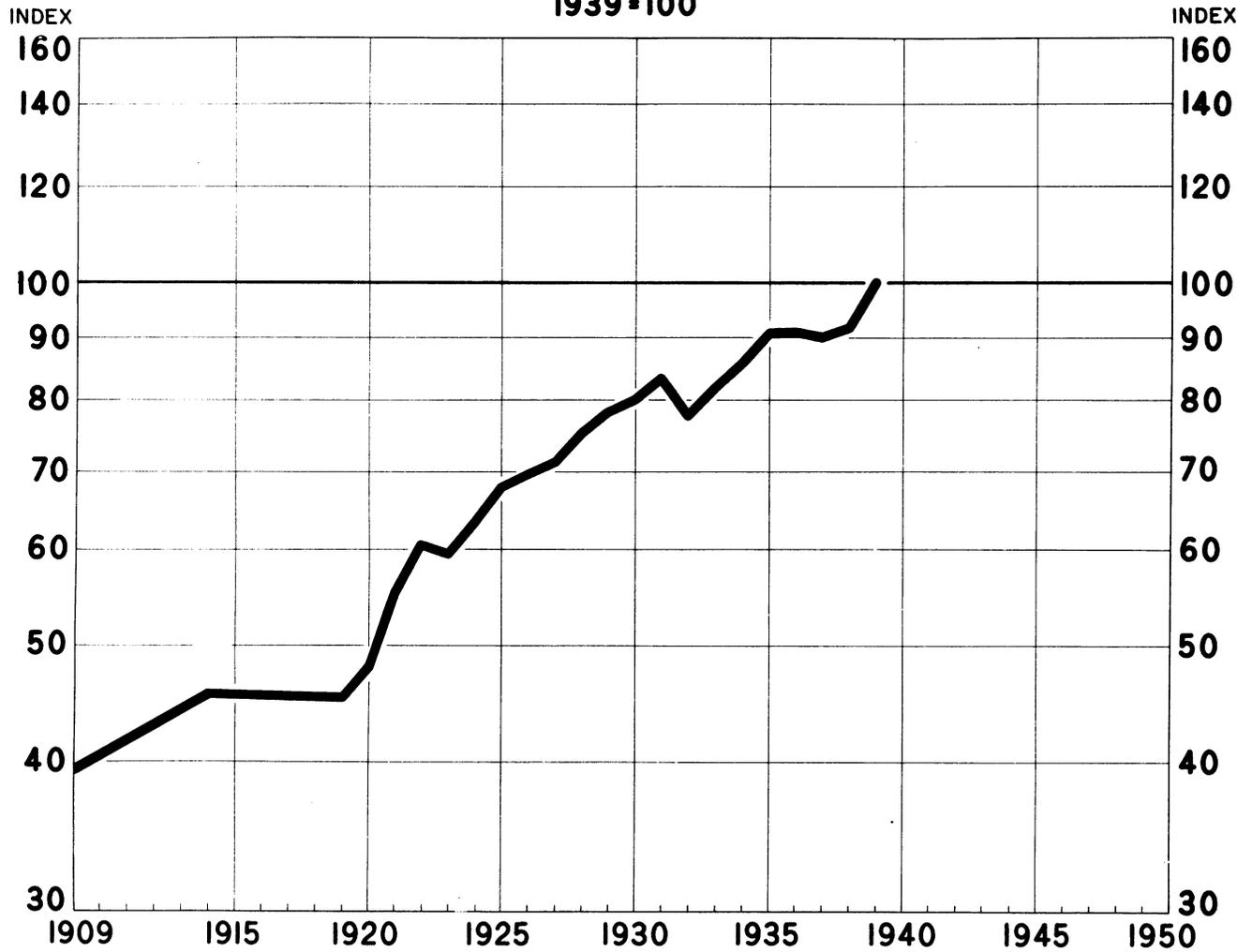
On the other hand, the war interrupted productivity advances in many industries, ordinarily referred to as "civilian industries" which were hindered by low priorities on labor, new machinery and materials, and high labor turnover. One example is the clay construction products industry which suffered a 22 percent drop in output per man-hour from 1939 to 1943. As production in this industry climbed back from its wartime low (48 percent of the 1939 level) to normal levels, productivity recovered remarkably, regaining 1939 levels by 1946. While, we have insufficient data to measure productivity in manufacturing as a whole since 1939, we know that the trends for individual industries have varied widely. The accompanying charts provide an illustration of the range of productivity changes which have taken place in the industries for which the Bureau of Labor Statistics has data.

Charts 2 and 3 serve to show that productivity changes during the periods 1941 to 1946 and 1947 to 1948 varied widely, industry to industry. Generally speaking, other figures not shown here indicate that the trends for those industries for which we have data were more favorable from 1939 to 1941 than during either the war period or the period of postwar readjustment. The industries shown are not representative of the entire economy, or even of manufacturing in general; hence it is not possible to state what the average percentage change was during the periods covered.

Realization of the striking differences in productivity trends of the various industries is extremely important. These diverse trends among industries characterize all periods of time. The index for manufacturing as

# OUTPUT PER MAN-HOUR ALL MANUFACTURING 1909 THROUGH 1939

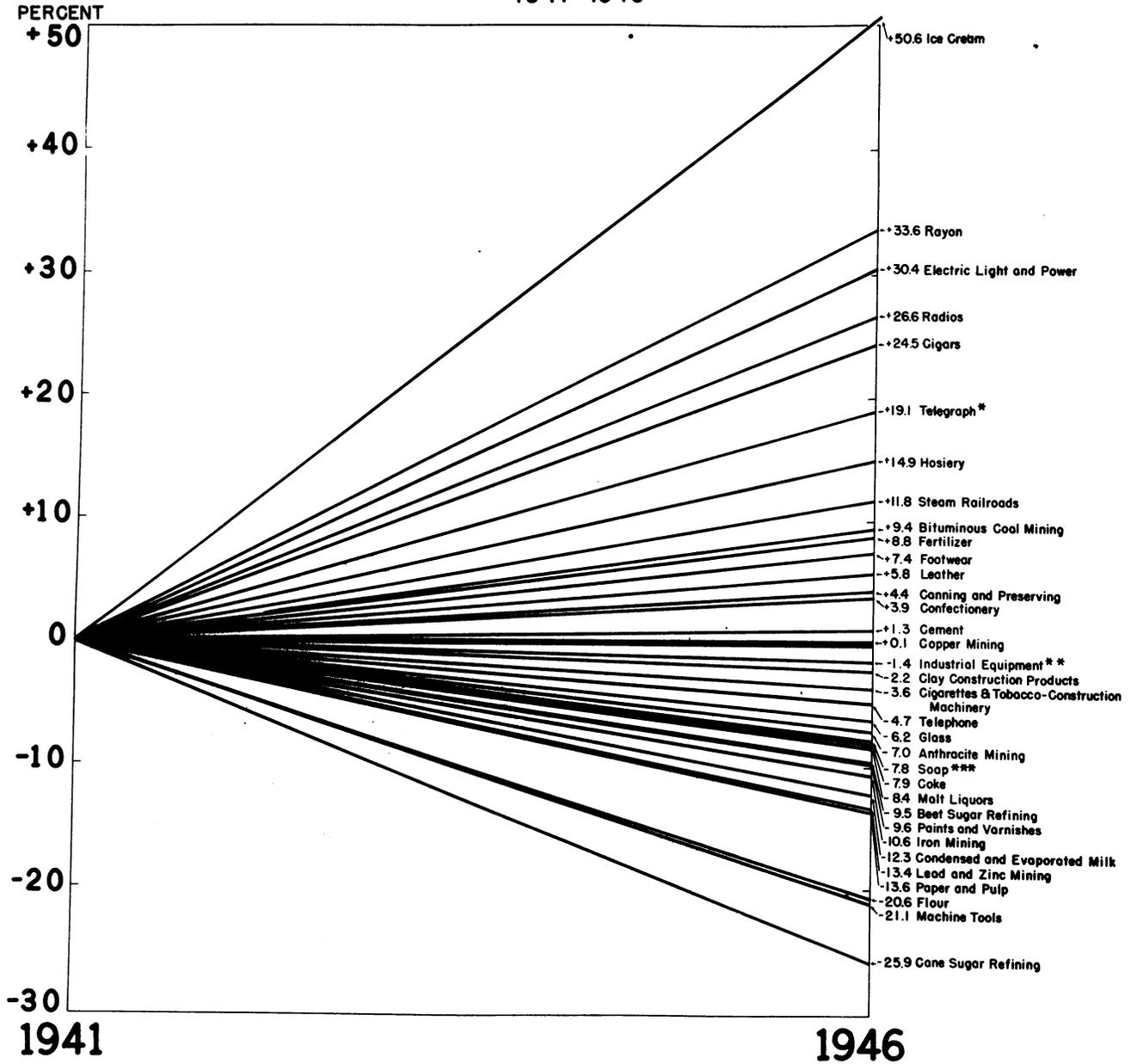
1939=100



# PERCENT CHANGES IN OUTPUT PER MAN-HOUR

## MANUFACTURING AND NONMANUFACTURING INDUSTRIES

1941-1946



UNITED STATES DEPARTMENT OF LABOR  
BUREAU OF LABOR STATISTICS

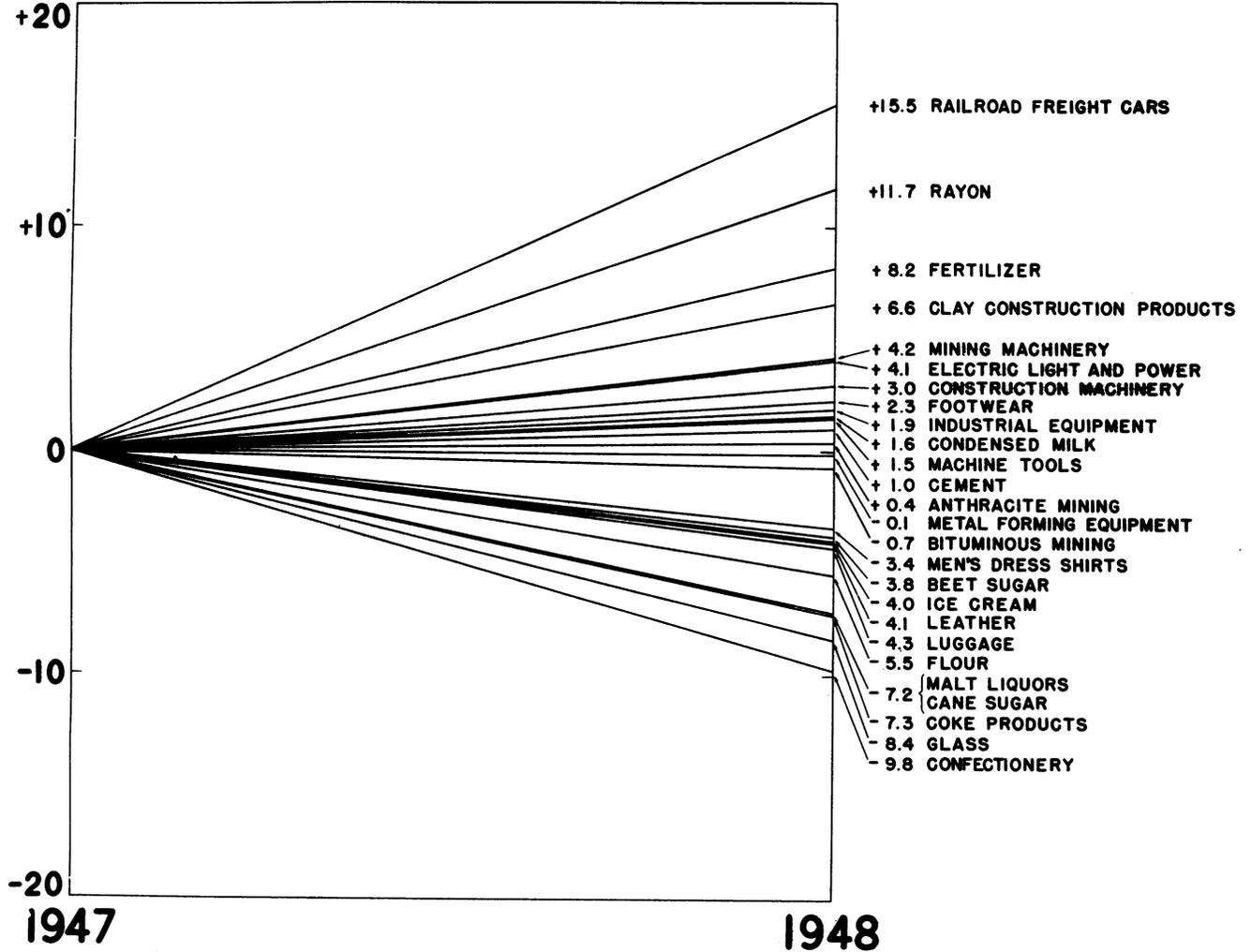
\* OUTPUT PER EMPLOYEE  
\*\* 1941-1945  
\*\*\* 1942-1946

# PERCENT CHANGE IN OUTPUT PER MAN-HOUR

## MANUFACTURING AND NONMANUFACTURING INDUSTRIES

PERCENT OF CHANGE

1947 TO 1948 (PRELIMINARY)



a whole, then, is an average of the indexes for the component industries and represents the net effect of many widely dissimilar separate trends. As a consequence, no industry can safely assume that its productivity is increasing on the basis of an increase in the index for all-manufacturing.

Within industries, also, there are sharp differences in productivity trend--whether the comparison is made between individual plants or between the various products of the industry. The following Chart 4, presents an example of divergency among individual plants. In the first illustration, changes from 1939 to 1946 in factory man-hours expended per unit of production (the reciprocal of output per man-hour) are shown for a number of leather tanneries. Each line on the chart represents one company and shows the percent change in the number of man-hours required to produce a square foot or pound of leather in 1946 as compared with 1939. Most firms reported that unit man-hour requirements increased or decreased less than 10 percent in this seven-year period. Note, however, that a number of firms experienced increases as high as 47 percent and declines of more than 50 percent.

An example of divergent productivity trends for products rather than for plants is illustrated in Charts 5 and 6, showing factory man-hours expended per unit of product in the manufacture of various types of construction machinery. In the upper left-hand corner, the composite trend for all reported products is shown. You will note that there were no large increases or decreases for the industry as a whole in the average man-hour requirements per unit of production; the index rose less than 10 percent over the entire period. In the series for the individual products, however, productivity changes of considerably greater magnitude occurred. Generally favorable trends are reported for tractors and power shovels, while a substantial decrease in unit labor requirements took place in the production of three-wheel rollers. Increases ranging from moderate to severe occurred for other product groups.

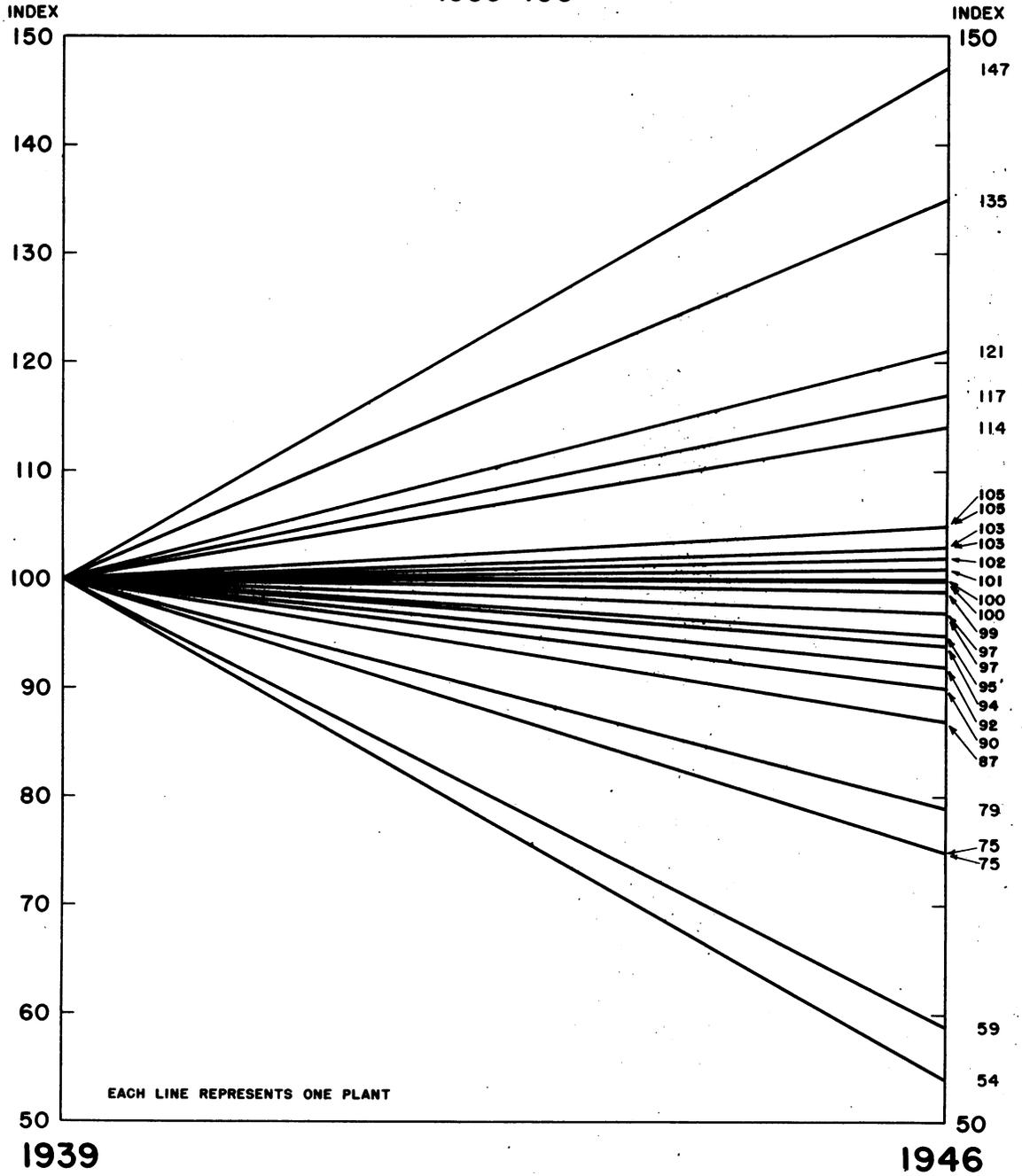
One of the most important of the influences which can bring about long-term or short-run changes in productivity is the attention given to improvements in production techniques, plant layout and work flow, and the replacement of inefficient machinery. Chart 7 presents a comparison of the experiences of two comparable groups of industrial equipment plants, one of which introduced some improvements of this type while the others reported that no changes had been made. You will note that in the relatively short period of six years, output per man-hour for plants making improvements increased almost 15 percent, while for the other group, output per man-hour declined nearly 20 percent.

It seems likely that a large share of the variation in productivity trends for individual manufacturers represents differences in managements' success in planning and controlling production within the plant. The variations in trend indicate areas in which productivity may be increased. If performance in the less efficient plants were improved, not to equal that of the best, but to the level of some of the better firms, the average productivity level for the industry would increase considerably. Such an improvement would require no new discoveries, but simply involve the adoption of techniques already in use elsewhere in the industry.

CHART 6

# PLANT DIVERGENCE OF TOTAL FACTORY MAN-HOURS PER UNIT FOR THE MANUFACTURE OF LEATHER

1939=100



UNITED STATES DEPARTMENT OF LABOR  
BUREAU OF LABOR STATISTICS

CHART I

# TRENDS IN MAN-HOURS EXPENDED PER UNIT

## Selected Types of Construction Machinery

1939 = 100

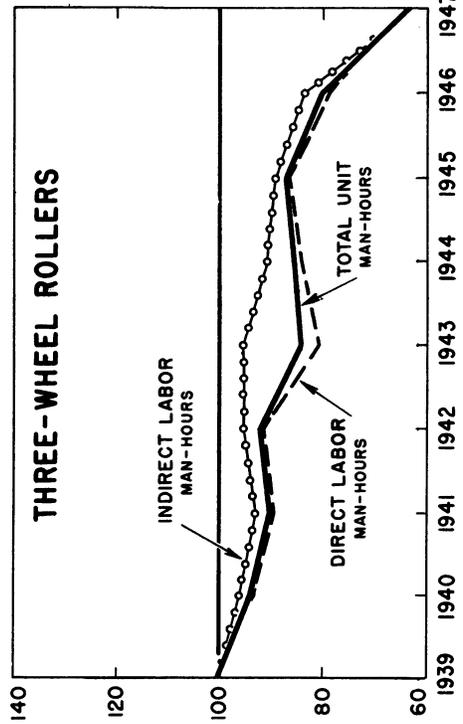
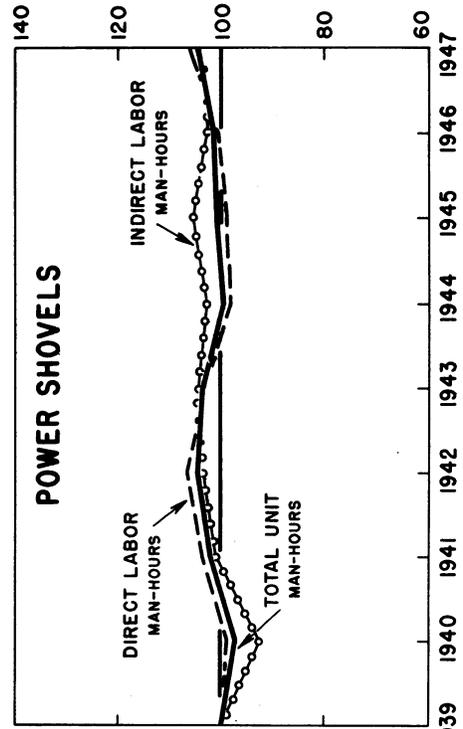
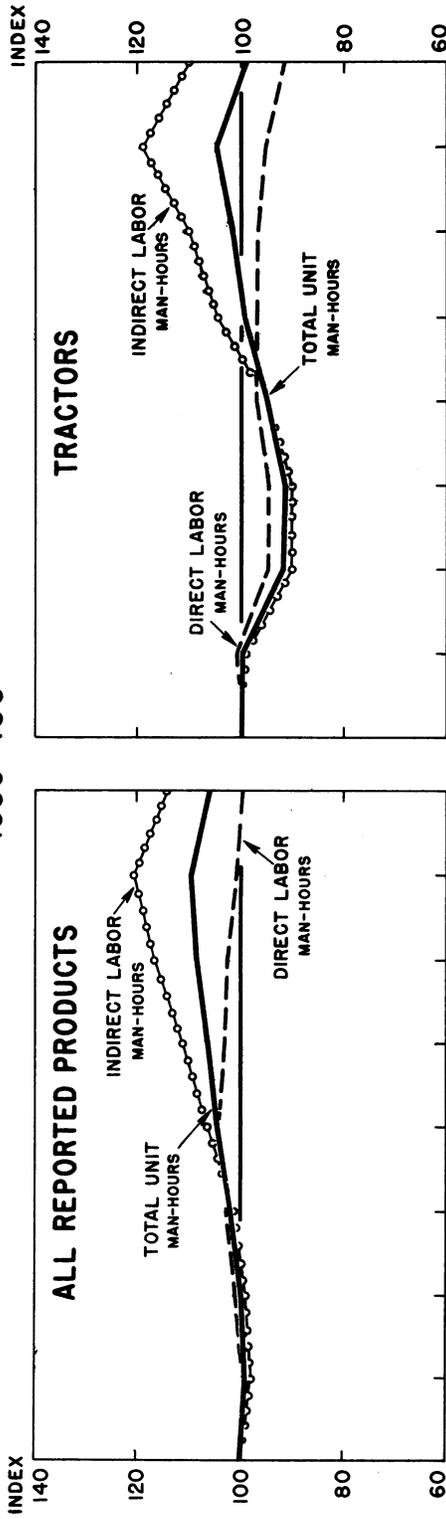
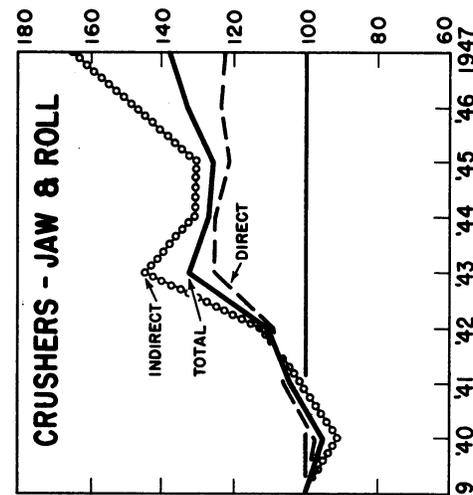
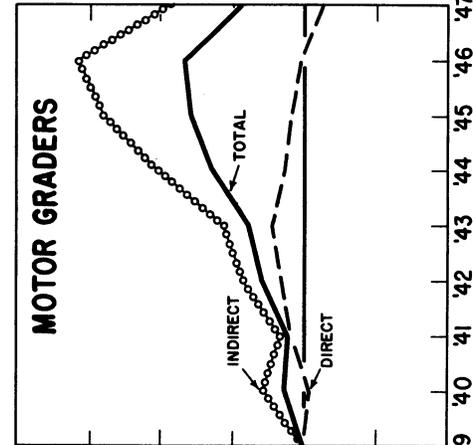
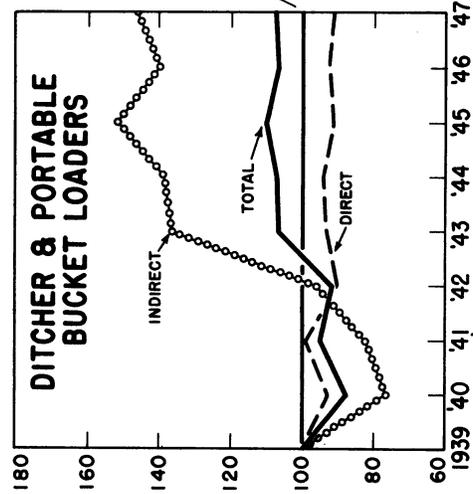
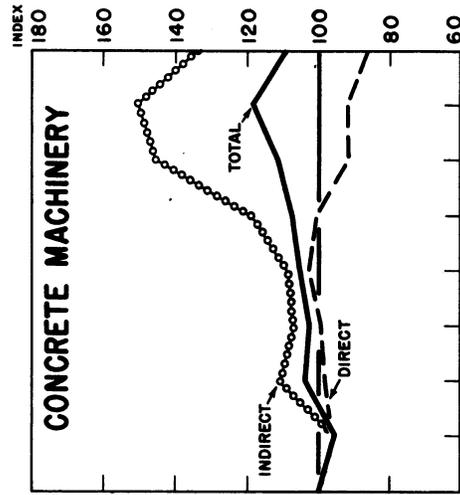
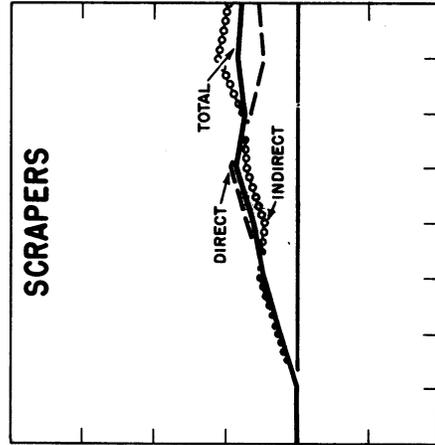
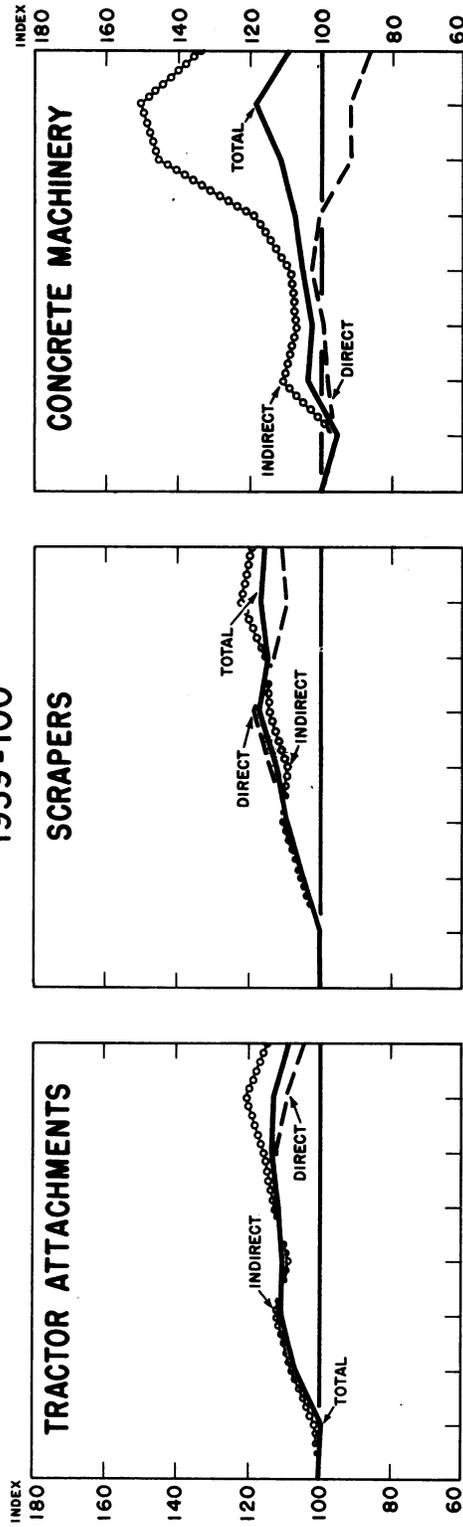


CHART 2

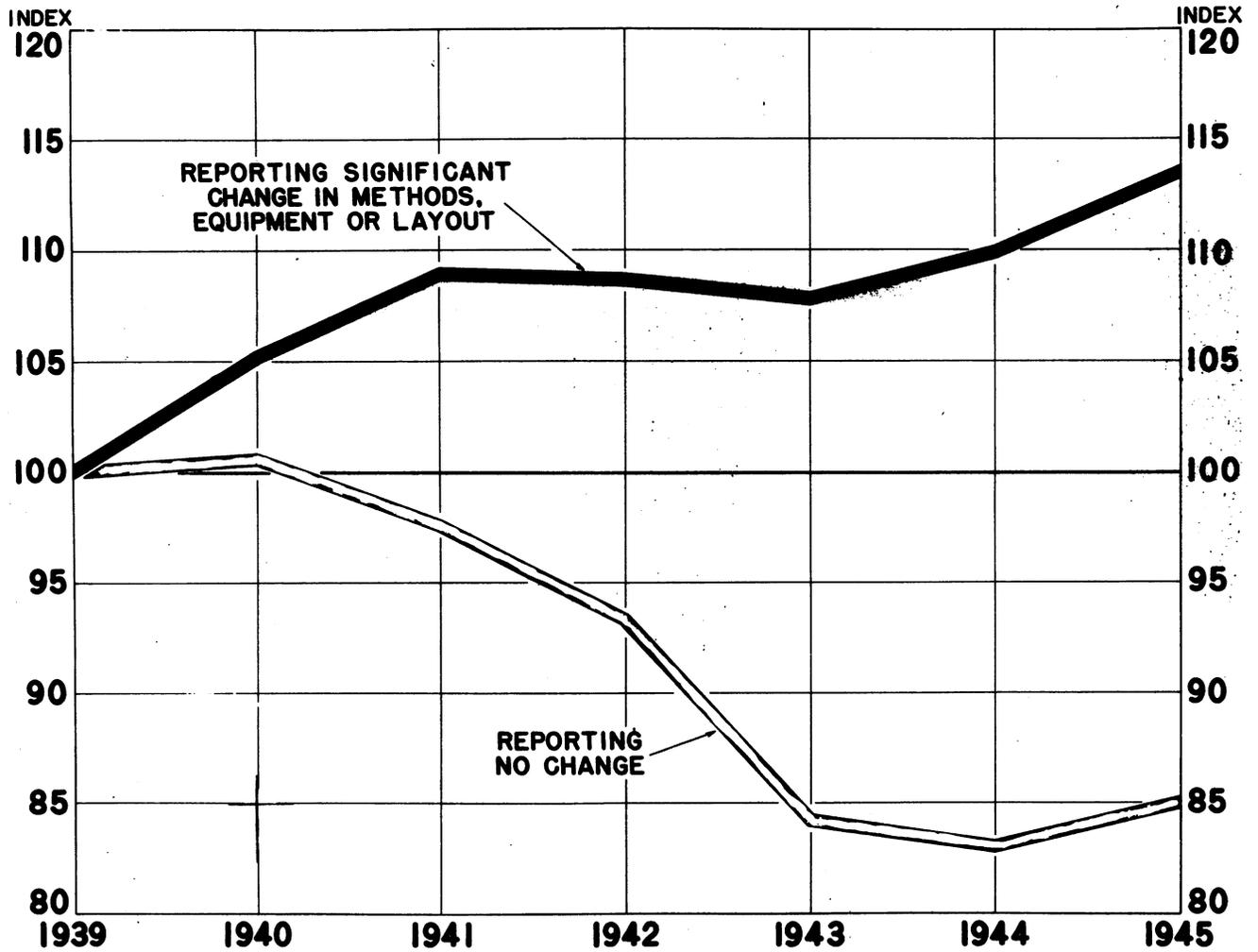
# TRENDS IN MAN-HOURS EXPENDED PER UNIT

## Selected Types of Construction Machinery

1939 = 100



# OUTPUT PER MAN-HOUR, TWO GROUPS OF INDUSTRIAL EQUIPMENT PLANTS



Despite the wide variations in productivity from plant to plant and product to product, it is evident that for the vast majority of industries output per worker and per man-hour are higher in the United States than in other industrial countries. A British economist, L. Rostas, estimates that output per worker in manufacturing in the United States was over two times that in the United Kingdom for the years 1935 to 1939. In the United States the work week is shorter on the average than in Great Britain, with the result that differences in output per man-hour are even more pronounced. According to French sources, recent statistics indicate that output of steel per man-year in the United States is almost two and a half times that in France; automobile production per man per year is four times that of France, and productivity in agriculture is three times the French level. In Belgium, another highly industrialized country, average production per man-hour according to recent estimates, is less than one-third the levels for corresponding industries in the United States. In the mining industries, American production per man-hour is 800 percent higher; in iron and steel, 250 percent; in the shoe industry, 410 percent greater.

In order to explain these productivity differentials, it is necessary to examine the techniques of production. Basic scientific research and technology are at least as far advanced in Europe as in the United States, but the application of technology to industrial methods has not progressed so far. In short, America has more "know-how." During the past few decades, industrial methods, factory organization, and manufacturing equipment have developed along different lines, and as a result productivity, has increased in the United States at a greater rate than in other countries.

As a consequence of this spread in productivity trends and levels, European workers can purchase only a fraction of the necessities and conveniences of life available to American wage earners. For example, the average unskilled worker on a radio assembly line in this country earns enough in two or three days to purchase a standard table model radio. In England or France, radio factory assembly workers have to work more than three weeks to earn enough to purchase a comparable radio. One farmer in the United States produces enough food to feed 15 wage earners; but in France, where farming is much less mechanized, one farmer produces only enough to feed five factory workers.

We have seen that the United States has the lead in productivity and hence, in the standard of living. A basic question we must face is, Will this trend continue or will we enter a period of industrial maturity and decline? This question we cannot answer here. The answer will be provided by managers and workers in thousands of plants. The high level of productivity which we have enjoyed has resulted in large measure, not from startling, labor-saving inventions which displace great numbers of workers (although there have been some of these), but from day-to-day, year-to-year improvements in machinery, plant layout, production design, production planning, etc.--the development by management and labor of the most efficient ways of doing thousands of small tasks.

Many Bureau of Labor Statistics surveys show clearly that changes in productivity result from a combination of many causes. When there are both favorable and unfavorable factors present, it often happens that a few unfavorable forces operating within an industry may more than offset the favorable forces so that a decline in productivity occurs. For example, in the construction machinery industry productivity declined between 1939 and 1947 primarily because of shortages of critical materials, an increase in the relative number of man-hours devoted to training, supervision, maintenance work and machine set-up, and a decrease in the average skill of the work force. Output per man-hour dropped in this industry, despite continuing large-scale technological improvements and the highest volume of output and greatest degree of product standardization in the history of the industry.

In general, conditions during the past eight years have been unfavorable to higher productivity (at least in all but the wartime munitions industries). Continued improvement in long-time productivity trends requires a predominance of favorable influences in industry. We cannot afford to sit by and wait for favorable conditions to raise productivity levels, for to do so could result in industrial decline. Rather, conscious effort is required to improve productivity trends, by strengthening favorable factors, and counteracting unfavorable tendencies. This requires that plant management and labor officials must not only concern themselves with production, profit, and cost trends, but must understand and base their decisions on productivity trends as well. This means that productivity statistics should become a more familiar and a more frequently-used tool in everyday affairs.

The contribution of the technician and of management to industrial progress is well known. The American worker, too, has done a great deal to bring about industrial progress. As productivity and living standards rose, the physical burden on the worker became lighter. This, in turn, led to a greater willingness and ability of American workers to employ ingenuity in contributing to the development of new ways of doing the job, simplifying the work and improving output. The worker in the United States has to adapt himself constantly to changing job conditions, to new machinery, and often to new work duties. As a result, the American worker has developed an adaptability and willingness not only to try new ideas but to contribute his own ideas to improving the productive process. The flexibility and alertness of the American worker is unique throughout the world.

I have not dealt specifically with the relationship between productivity and employment. There is considerable misunderstanding of the relation between high productivity and employment levels. A number of years ago new inventions were viewed as a positive threat to the worker, for it was felt that any labor-saving device would throw workers out of jobs and result in permanent unemployment. This view has happily been abandoned. There does exist, however, some apprehension over continued productivity advances. Particularly during times of depression, attention turns to the study of "technological unemployment." When many millions were unemployed it is understandable that each new increase in productivity would be viewed with misgiving. We know, however, that it is not high productivity which causes unemployment, for in a healthy economy high levels of output per man-hour provide the possibility of increased total output and higher standards of living. The introduction of the strip mill in

the manufacture of steel, for example, displaced many workers and man-hours, but this innovation of the 1930's contributed to the record wartime and postwar production levels in the steel industry. Extreme instances of labor displacement come to our attention, but what many persons forget is that savings in man-hour expenditure are occurring continually, and these day-to-day savings have resulted in more employment at higher wages. The relatively small amount of short-run technological unemployment can be handled through a number of devices worked out, either as part of a social insurance system or through labor-management agreements.

While we have no complete picture of the current levels of productivity for all manufacturing industries combined, we do know something about a number of individual industries. As we can see by returning for a moment to Chart 3 showing percent changes from 1947 to 1948, the trends are diverse. Since the industries are so few in number, it is not possible to generalize for industry as a whole. In some of the basic heavy industries, not included here, we have heard reports of improved productivity during 1948, and it is likely that in the steel blast furnaces and rolling mills productivity in 1948 is considerably above 1939 levels. Some of the consumer non-durable goods industries are still hindered by inability to replace old equipment and expected productivity advances have not occurred. Other industries have improved quality of output and in so doing suffered an apparent productivity decline.

Perhaps our best approach in looking into the future is to realize that the United States has the resources and technical ability to retain its lead in production efficiency and levels of living. To do so, however, we must maintain our flexibility and continued willingness to try new ideas and processes. The war has been a great deterrent to productivity advance in many industries, and in some the postwar adjustment is not yet complete. Problems of high overhead, problems concerning markets, must be solved; and a high level of employment and purchasing power must be maintained if we are to receive the benefits of increasing productivity. Some of these problems are dependent for solution on factors beyond the control of individual plant managers or labor organizations. The problem of increasing the general level of productivity, however, is one toward which the efforts of individual plant managers and workers is essential. The Nation must look to the individual industry and labor groups to provide higher productivity levels which can be attained, even within existing technology, through continued efforts to improve methods, reduce overhead, improve production scheduling and the adoption of myriads of seemingly unimportant changes which, taken in the aggregate, result in high productivity. If these things can be done, the United States will continue to lead the world in industrial strength as well as in the standard of living of our people.