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INVESTIGATION OF CONCENTRATION OF ECONOMIC POWER

TEMPORARY NATIONAL ECONOMIC COMMITTEE

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POWER IN, AND FINANCIAL CONTROL OVER,
PRODUCTION AND DISTRIBUTION
OF GOODS AND SERVICES

MONOGRAPH No. 5

INDUSTRIAL WAGE RATES, LABOR COSTS AND PRICE POLICIES

Printed for the use of the
Temporary National Economic Committee



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MONOGRAPH No. 5

INDUSTRIAL WAGE RATES, LABOR COSTS, AND PRICE POLICIES

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LETTER OF TRANSMITTAL

JULY 22, 1940.

Hon. JOSEPH C. O'MAHONEY,

Chairman, Temporary National Economic Committee,

United States Senate, Washington, D. C.

SIR: I wish to submit for the record this series of reports on Industrial Wage Rates, Labor Costs, and Price Policies prepared by the Bureau of Labor Statistics for the Temporary National Economic Committee. It "gets down to cases" on what happens in particular companies when wage rates are changed, when prices change, and when new machines or techniques are introduced; it describes the processes by which these changes take place as management sees them, and discusses their varying effects on costs and on profits in six companies in four different industries. These studies represent an attempt to avoid that over-simplification which often results from the study of summarized over-all data on wages and prices.

Part I summarizes the conclusions of the entire study in its introduction, and presents in detail the results of the study of concerns in three industries, conducted by the staff of the Massachusetts Institute of Technology. In part I, the individual companies are not identified. They include two paper companies whose records were analyzed for the period 1936-38; two cotton textile mills, one northern and one southern, owned by the same large company, with records for the period 1936-38; and three shoe factories, two of which are owned by one company, with records available from 1931-38, and the third by another company, whose records cover the years 1936-38.

Part II presents a more comprehensive study of policy formation by the International Harvester Co. based on detailed records for a number of its plants for the period 1929-37. This study was conducted by the staff of the Bureau of Labor Statistics.

Because of the limited scope of this inquiry, it could not yield any final recommendations for Government policy, either legislative or administrative. Nevertheless, certain similarities in the policies of these companies in similar situations make possible a number of general observations and one conclusion, in particular, which may serve as a guidepost for governmental action. It is apparent that any general governmental action affecting wages or prices in a uniform or inflexible manner will inevitably have many repercussions, which may or may not be beneficial. Different industries and different plants in the same industry will not be equally affected, even though the action may appear in advance to affect all alike. For this reason, it is of the utmost importance to insure sufficient flexibility in legislation or regulation affecting industry to permit adjustments for differences between industries, as well as between segments of the same industry.

The four principal questions about the process of policy formation in individual business concerns to which this study is addressed are:

1. By what procedures and on the basis of what information do executives in particular companies decide to change wage rates?

2. What is the relation between these changes in wage rates and changes in what employees get for an hour's work (their average hourly earnings) and in the labor cost per unit of product?

3. To what extent are these changes in wage rates responsible for changes in costs per unit and in prices?

4. By what procedures and on the basis of what information do executives decide to make changes in machinery, processes, or techniques?

The answers to these questions may be summarized as follows:

1. Changes in wage rates often "follow the leader"—who may be impelled by a variety of reasons to initiate a change. These concerns, especially in the period of advancing wages since 1933, were influenced in wage policies to a surprising extent by the action of other companies and even of other industries. Different companies, of course, followed different guides. Some watched changes by their immediate competitors; others followed neighboring firms in different industries with which they competed for labor, while still others were concerned primarily with the broad movements in wage rates which affected all industry. In most of the companies wage policies were influenced by negotiations with unions or by the possibility of unionization. Where unions were strongly organized there was a greater degree of uniformity in the wage policies of competing firms in an industry.

2. When wage-rate changes were made, the effect upon the average return to workers (average hourly earnings) differed greatly from one plant to another. In some cases, average hourly earnings moved in direct proportion to changes in wage rates; in others there was little similarity in their fluctuations. Differences were greatest where payment was on a piece-rate basis, and there was a wide variety of products and skills, rapid technological change, and great variations in the volume of output. All these circumstances made for changes in average hourly earnings independent of wage-rate changes. On the other hand, where hourly rates were the rule, and where products and operations were few and standardized and where the speed of the machinery was controlled by management, there were similar changes in wage rates and in average hourly earnings.

3. Wage-rate changes were equally unsatisfactory as guides to variations in unit labor costs. Technological changes and fluctuations in the volume of output, particularly where most workers are paid by the hour, may cause such great changes in the efficiency with which labor time is used and hence in labor costs per unit of product that they offset even large changes in wage rates. Thus, in one paper company, wage rates were increased 19 percent between 1936 and 1938, yet because of a number of improvements in the paper-making machines, labor costs per ton of paper increased only 6 percent.

4. Price changes were not based primarily on wage rate changes, even when wage-rate changes were fully reflected in labor costs. Changes in labor costs were not the most important causes of changes in total costs per unit of output in any of the companies included in this study. In the International Harvester Co., changes in the overhead cost per unit of output due to wide fluctuations in the volume of production dominated the cost figures in the broad swings of business from great activity in 1929, to depression in 1933 and recovery in 1937. In the other three industries raw-material costs were the principal factors in changes in total costs per unit of output.

Moreover, the relations between costs and prices were by no means close, but differed greatly in character from industry to industry. These studies suggest that in most companies costs are far less important in immediate price-policy decisions than businessmen are accustomed to believe. In general, there was a tendency in periods of depression to try to reduce costs because of the declines in prices required by the market situation, and in prosperity to increase prices as required by rising costs. But costs and prices seldom changed by the same amount or in the same proportion. Cost was in reality a point of departure, its influence depending upon the degree of independence that each company had in fixing its prices or the nature of the competition it faced, the control it could exercise over its costs, and the attitude of its executives toward pricing.

Notwithstanding the subordinate role played by labor costs in price policies in these companies, labor costs were universally a principal concern of management because of their effect upon profits and upon the cash position of a company. There were numerous occasions when falling prices required cuts in costs to avoid or reduce losses, and labor costs were the only costs capable of immediate reduction. Although, in these companies, changes which could be made in labor costs were seldom sufficiently great to affect prices appreciably, they were great enough to make a big difference in profits.

5. It appears that technological changes were made by most of these companies as a routine matter, in their constant effort to reduce costs and to improve the competitive position of their products. Increases in wage rates did not immediately stimulate technological changes, although in the long run they undoubtedly enhanced the rate of their introduction. Savings in various costs—overhead costs, labor or material costs—and improvement of the quality of the product were the principal inducements to the introduction of new machines or processes. The timing of their introduction was in several instances planned to minimize labor displacement.

Although this inquiry is limited in scope, it is our hope that it may suggest a new and more fruitful approach to many students of the problems of industry.

The excellent cooperation given by all of the companies to the representatives of the Bureau of Labor Statistics and of the Massachusetts Institute of Technology cannot be overemphasized; without their assistance this series of studies would not have been possible.

These studies were conducted under the general direction of Aryness Joy, Assistant to the Commissioner of Labor Statistics and Director of Temporary National Economic Committee studies for the Bureau, and Edward S. Mason, professor of economics at Harvard University, who has acted as economic consultant in their planning. Field investigations on which part I is based were conducted and reports were prepared by members of the industrial-relations section of the Massachusetts Institute of Technology under the general direction of W. R. Maclaurin and Douglass V. Brown. The study of the International Harvester Co. was prepared by John T. Dunlop and Edwin M. Martin of the Temporary National Economic Committee staff of the Bureau of Labor Statistics.

Respectfully submitted.

ISADOR LUBIN,
Commissioner of Labor Statistics.

SUMMARY

The Temporary National Economic Committee in its examination of "the effect of the existing price system and the price policies of industry upon the general level of trade, upon employment, upon long-term profits, and upon consumption" is necessarily concerned with the factors which determine business policies.¹

The present series of studies—which is limited in scope and experimental in character—seeks to secure some understanding of the considerations governing business policy decisions, to measure certain effects of these decisions, and to test procedures for carrying on further studies of this character.

The two volumes of this report summarize a survey of six firms in four widely different industries made during the summer and autumn of 1939. Two of the firms make paper, two make shoes, one manufactures cotton textiles, and one produces agricultural implements. These firms are not necessarily representative of their industries, since better-than-average cost records were essential to the inquiry.

It must be emphasized that the information in this monograph was obtained solely from executives in each company—not from their competitors, the buyers of their products, or their employees' organizations. Visits were made to the plants whose operations are described here. Accounting records and statistical data were examined in detail, and most of the principal executive officials were interviewed. The object was to picture certain business decisions as they appeared to businessmen. This report, to be sure, is not couched in the language of business, because it seeks to describe certain problems as they affect the economy generally and not merely the particular firms involved.

This inquiry is primarily concerned with the following subjects:

(a) The processes of wage determination, particularly changes in wages.

(b) The effect of changes in wage rates on average hourly earnings and on labor costs.

(c) The relation of wage policy, as reflected in labor costs, to total costs and to price policy, and the extent to which this relation is influenced by the methods of cost accounting in each case.

(d) The processes by which technological changes are made.

Each day businessmen are called upon to make many decisions: Decisions on prices and terms of sale and marketing policy, on the purchase of raw materials, on the wages of employees and the conditions of their employment, on the planning of production, the introduction of new machinery, and so on. In all of these they are guided by certain external conditions, such as the condition of the market for their product, the availability of labor, and the actions of competitors. Despite limitations of this kind, business executives have

¹ See Public Res. No. 113, 75th Cong.

large opportunities for the exercise of judgment and discretion, and the net result of their daily decisions has a far-reaching effect which is too often ignored in discussions of industrial problems.

In view of the important role which the actions of these executives play in directing the course of the Nation's economic activity, an understanding of the processes underlying them is essential. In any study of the policies of an industry or a company, it cannot be too strongly emphasized that decisions are made by human beings, and that they reflect the experience and judgment, the habits, preferences and prejudices of the individuals who make them. The questions with which this report is concerned have been approached with this in mind.

With regard to changes in wage rates, for example, an effort was made to weigh the relative importance to the executives in these individual concerns of the various elements which they must consider, such as their operating margins, the desire to conserve assets during periods of depression, the wage policies of competitors in the same line of business or in the same labor market, and the activities of labor organizations.

Businessmen, as well as the public and workers, have become accustomed to thinking of wage rates as measuring workers' income on the one hand, and labor costs on the other. Yet it is apparent that wage rates as such are not the only elements affecting either workers' income or producers' labor costs. The relations which exist in different companies between wage-rate changes and changes in average hourly earnings and in labor costs and the factors which are of most importance in determining these relations, form a major segment of this report.

To discuss the importance of wage changes to price changes requires measurement of the effect of wage-rate changes not only on labor costs but on total costs, and an understanding of the basis on which executives decide to price their products at a certain level. In any course of action affecting either wage or price changes the accounting practices by which costs are determined in each company frequently have an important influence. The calculation of both labor costs and total costs per unit of output is a complex process involving many conventional accounting assumptions. Cost itself is not always clearly definable and, more particularly, it is not always susceptible of precise calculation. Because of its importance in company policies of all kinds, the accounting basis for costs in each company is discussed in some detail, together with its relation to prices.

With regard to prices, the degree of latitude available to businessmen in these and other companies varies widely, depending upon many conditions, such as the size of the individual concern and its relative position in the industry, the extent to which its product or its services differ from those of its rivals, and so forth.² The present series of studies affords an opportunity to examine the extent to which such considerations are operating in specific instances. Within the limits of discretion available to any concern, the policy it actually adopts with respect to prices depends upon many considerations, such as the supposed effect of prices upon volume, the effect of changes in volume on the cost of production as reported by the company's accountants, and very importantly, the ideas of the responsible executives

² For a more extended discussion of a number of the considerations on which executives base their price decisions, see Part II, chapter II.

with respect to the problems before them. It must never be forgotten that businessmen must work, at best, with approximate information, and that there are many commodities with respect to which it is extraordinarily difficult—perhaps impossible—to estimate price-volume relationships.

An appraisal of the various conditions under which each company determines its prices has been a necessary preliminary to any conclusions about the degree to which price changes are dependent on or influenced by the single factor of wage-rate changes. In this connection it must also be remembered that businessmen's decisions are almost invariably based upon certain anticipated future conditions. A decline of business activity, that appears in retrospect to be obvious and well defined, is rarely clear at the outset.

Finally, the relations between wage rates, hourly earnings, labor costs, and total costs are directly affected by technological changes. The rate at which such changes are adopted is of vital importance to individual employees who may be displaced and to the durable goods industries which make the new machines. Consequently, an understanding of the circumstances under which it is decided to change processes or to install new equipment is of wide interest.

The following chapters represent merely the beginning of an inquiry into these four broad problems. Only a few concerns are included and for most of them records were studied for only a short period of time. Although it would be unwise to generalize broadly on their experience, it seems clear that any public action in the field of industrial regulation must take into account the nature of the processes by which executives of individual firms determine policy and the limits within which they are free to act, and these analyses point the way to further study in this important field.

It should be emphasized that these studies could not have been made without the close cooperation of company officials, who made it possible to answer certain questions to which only they could provide the answers. At the same time the use of company data exclusively sets certain limits to the problems which could be effectively explored.

There follows a brief summary of the findings of this inquiry, with respect to the four questions outlined above.

WAGE POLICIES

The formulation of wage policies as described by the responsible executives in the companies studied is by no means a simple process. Policy must be adapted to probable future trends as well as to present conditions, and must consider many factors, some of them representing quite conflicting interests.

Officials of no two companies saw the wage problem in exactly the same light. Some executives believed that wage policies in their companies should conform to the broad movements in wage rates throughout industry; others looked for guidance mainly to the actions of particular firms in their own industry. In some cases, emphasis was upon the wages paid by companies which competed directly for sales, while in others more importance was accorded to the policies of firms which drew upon the same supply of labor or were located in the same community. The capacity to increase rates develops out of year to

year increases in efficiency. Such increases are usually small, whereas at any time a wage rate increase is likely to be substantial. Therefore rising prices often seem to be considered necessary if wage increases are to be made. In some cases the relation between prices and wages must be considered as a reciprocal one, with the differences being merely ones of relative importance in a given situation.

Probably all companies would agree that price trends are significant for wage policy; yet the way in which prices influence wages depends largely on the extent to which each company has its prices fixed for it by market forces, or is more or less free to base its prices on costs. To the extent that the latter is the case, wage decisions are relatively unaffected by price trends, but when prices are market-fixed, declining prices require cost reductions. Wage-rate changes are one of the most generally used methods of reducing costs.

Broad trends in the wage policies of industry were considered useful guides to their own wage changes by executives of the International Harvester Co., of one company (company A) in the paper industry and one company (company X) in the shoe industry. General economic conditions as reflected in shoe prices were considered important by both shoe companies. Officials commented that when demand and prices are rising, the "atmosphere is good" for wage increases; when business is bad and prices are falling, wage cuts are "in the air."

Particular attention was given to the wage policies of other firms in its own industry by the cotton textile company, company A in the paper industry, and company X in the shoe industry. In fact, the cotton textile company had no other conscious wage policy, according to its officials, than to follow the actions of other cotton textile concerns. Officials of company X in the shoe industry stated that any attempt to adopt a wage policy contrary to that followed by the shoe companies belonging to a trade association in a nearby large city would meet with vigorous protests from officials of these companies, largely because of the effect such action would have on their relations with the union to which both their employees and those of company X belong.

In the actions of firms competing for labor (whether in their own or other industries) were regarded as of great importance; in others, the wage policies of companies in the same industry were more influential. In general, wage changes were not influenced to as great a degree as might have been expected by policies of competing firms in the same industry.

The International Harvester Co., for example, in order to keep its skilled employees and to obtain the best available local labor, watched closely the wage changes made during 1936-37 by the steel and automobile industries, several of whose plants are located in the same towns or in nearby towns. Company X in the shoe industry also expressed strong interest in securing the best workmen available. Its officials said that their policy was to recruit and keep a capable force by raising wages before other shoe companies did so and by reducing them last, and by making it possible for their employees to secure high hourly and weekly earnings, despite relatively lower piece rates. The latter was made possible by an unusually efficient plant lay-out, by large volume on single styles and sizes, and by minimum standards of output which all employees had to meet.

Company X in the shoe industry exchanges cost and price information with its principal competitor, but is not greatly concerned

by the fact that its labor costs are apparently higher than those of this competing firm. Sales are not considered by executives of company X to have been affected appreciably, because the better workmanship and general reputation of their shoes make customers willing to pay more for them. In this case, the existence of some freedom in price policy is reflected in wage policy.

The wage policy of each company was influenced by its financial position. Profits or losses were stressed as important factors in their wage decisions by executives of both paper companies, by company X in the shoe industry and by the International Harvester Co. In the two paper companies it was suggested that the cash position of the company might require wage cuts in periods of prolonged depression.

This is a study of policy making as seen by business executives, and does not attempt to determine the conditions that lead to the timing of pressure by unions for wage increases or appraise their influence on wage scales. In many industries strong unions play a fundamental role in bringing about wage increases or in forestalling decreases. In general, it may be assumed that strong unions exert more or less continuous pressure for higher wages, not only within the plants in which they are organized, but more broadly, extending beyond their immediate areas of negotiation. As a rule, where strong union organization exists there appeared to be more uniformity in the wage policies of the companies throughout the industry.

For example, prospect of outside union organization was suggested by executives of company X (with respect to plant 2) and company Y in the shoe industry as having influenced their wage policies at some time during the period covered by this study. The pressure of spreading labor organization, together with general wage increases throughout industry, was also influential in effecting wage increases in the International Harvester Co. in 1936-37, according to officials of the company. In these plants and in company A in the paper industry employee organizations either did not exist or were unaffiliated organizations which for the most part did not actively participate in wage negotiations.

During the years covered by this inquiry, unions participated directly in the wage decisions affecting both plants of the cotton textile company, plant 1 of company X in the shoe industry, and company B in the paper industry.

WAGE RATES AND AVERAGE HOURLY EARNINGS

The experience of these companies makes it clear that changes in wage rates and in average hourly earnings are not always comparable. At least two types of industrial situations may be distinguished. In industries where piece rates are the rule, where many products requiring a considerable variety of skills are made and fluctuations in volume of operation are great—as in the International Harvester Co.—the differences between changes in wage rates and in average hourly earnings are quite marked. In industries in which hourly rates are the rule, or where operations and skills are more standardized and products fewer, and where speed of operations is more readily controlled, changes in wage rates and in average hourly earnings are more likely to be similar. This is the case, for example, in certain cotton textile and paper mills.

In the International Harvester Co. where employees are paid on a piece-rate basis and many different products are made, average hourly earnings increased by a larger percentage between 1933 and 1937 than did wage rates in 11 of the 12 plants for which data were available. For example, in the Canton, Ill., plant wage rates were increased 43.8 percent while average hourly earnings rose by 72.3 percent; in the Fort Wayne plant wage rates increased by 50.8 percent and average hourly earnings by 77.7 percent. There are a number of reasons for this divergence during this period of expanding production. The steadier flow of work accompanying the higher level of output, improvements in tools without adjustments in piece rates, the increased skill which comes from regular work on the same model, the willingness of employees to step up their output during periods of active business when they know that there is plenty of work to do, were all important factors in the relatively greater advance in hourly earnings.

In the same company during the period of declining output and wage rates, declines in average hourly earnings lagged behind cuts in wage rates, although by 1933 they were both at almost the same level in relation to 1930. In part the lag in the fall of earnings was due to the policy of laying off first the workers who had been most recently employed and were receiving the lowest rates of pay within their particular occupations. The discrepancy between the movement of wage rates and of average hourly earnings represented primarily shifts in the proportion of workers at each earnings level, rather than slower declines in hourly earnings than in wage rates of individual workers.

In contrast with the general experience of employees of the International Harvester Co., the average hourly earnings of workers in both the northern and southern cotton textile mills discussed here changed by practically the same percentages as wage rates during the 3 years (1936-38) for which data were made available. During this short period there was comparatively little change in volume and in type of operations, in cotton textiles in contrast to the marked changes shown in the longer record of the International Harvester Co., discussed above. Although most of the workers in these textile mills are paid on a piece-rate basis, the speed of the machinery which they tend is so fixed that there is little opportunity for variations in the output per worker. Moreover, the one technological change made by the company which speeded up the average rate of loom operation was accompanied by a readjustment of individual piece rates on new looms, with the result that earnings were maintained virtually unchanged.

There was also a close relation between changes in wage rates and in average hourly earnings in the one paper company for which earnings data could be computed. Here, however, most employees are paid on an hourly basis, but average hourly earnings fluctuated as much as 4 percent in periods when wage rates were constant, due to the effect of changes in the volume of output on the make-up of the labor force. During periods of expanding volume, average hourly earnings showed a tendency to decline because new workers were added at a wage rate which began at an hourly minimum for each occupation and increased automatically with each 3 months of service.

Thus each of these companies (and quite probably every industry) has certain special characteristics which determine the relation that will hold between the course of wage rates and the trend of average

hourly earnings. At some times they may move together closely, at others diverge widely, depending upon such factors as changes in the volume of output, the rate of technological change, and the morale of the workers. It is clearly not correct to assume that they will move together.

WAGE RATES AND LABOR COSTS

Changes in wage rates are important to workers in terms of their effect on earnings, but the primary concern of the managers and owners of business is their influence on labor costs. Just as changes in wage rates do not necessarily result in corresponding changes in average hourly earnings, so the relation between wage rates and labor costs is by no means direct. The records of the companies included in this study clearly indicate that it would be erroneous to assume that an increase of, say, 10 percent in wage rates is necessarily accompanied by an increase of 10 percent in labor costs, or that a 10-percent cut in wage rates is always followed by a 10-percent drop in labor costs. Many factors beside wage rates influence labor cost. The relation between changes in wage rates and labor costs is somewhat closer where workers are paid by the piece than where they are paid by the hour, but even in the former case the trends of wage rates and labor costs are not necessarily parallel.

The data suggest that the divergence between changes in wage rates and in labor costs becomes increasingly pronounced over a period of time, and that it is accentuated by changes in the volume of output. While the comparison for most of the companies studied is available only for the relatively brief period 1936-38, the International Harvester Co. and company X in the shoe industry supplied figures for a considerably longer time. In general, the correspondence between rates and costs was closer for the shoe and textile companies than for the International Harvester Co. and the two paper manufacturers. Comparative records furnished by the International Harvester Co. covered a selected list of 13 machines for the periods 1929-33, 1933-37, and 1929-37. During the years of declining volume from 1929-33, unit labor costs fell less rapidly than wage rates, largely because when volume is small the company cannot use efficiently the senior, more highly skilled and hence better paid employees which it retains on its rolls. Moreover, when smaller runs of a given machine or size are being produced, there is an increase in the cost of preparation and of shifting over from one model to another, and the productivity of labor is correspondingly decreased. From 1933 to 1937, on the other hand, a rapid expansion of output was accompanied by a smaller increase in labor costs than in wage rates. Technological changes and an increase in operating efficiency at high levels of output were largely responsible. Over the full span from 1929 to 1937 labor costs increased substantially less than wage rates on three of the seven machines whose design was not greatly changed. In the case of the other four, the changes in wage rates and in labor costs were of about the same magnitude.

Company X in the shoe industry provided data on wage rates and labor cost changes for each season from 1931 to 1938. In both plants of this company changes in wage rates and in unit labor costs for a typical shoe were similar. There were, however, substantial fluctuations in labor costs which were not associated with general changes

in wage rates. For the most part these movements were due to the varying intensity with which services of employees paid by the hour were utilized, as a result of changes in the volume of production.

Data for the other companies were all for the 3-year period 1936-38. In the other shoe company, company Y, and in both the northern and southern plants of the cotton textile company, wage rate changes were followed by proportionate changes in labor costs with almost no exception. In both of these companies the majority of workers are paid on a piece rate basis, diminishing the effect of changes in the volume of output on labor costs. In these companies as in company X in the shoe industry, there were no technological changes which affected labor costs appreciably during this period.

Both technological improvements and fluctuations in the volume of output had significant effects on the unit labor costs of companies A and B in the paper industry. The comparisons are less satisfactory in this industry, however, since the labor cost figures are for the total monthly output of each plant rather than for a single homogeneous product. Since labor costs are higher for some grades of paper than for others, some of the fluctuations in labor costs are due to changes in the nature of the paper produced. In company A changes in the volume of output had the greatest effect on labor costs, and as a result changes in labor costs were quite out of proportion to those in wage rates. Unit labor costs increased as volume fell and declined as volume expanded. In this industry set-up costs—that is, the cost of preparing for each run—are an important element, so that short runs when orders are small involve considerable increases in unit costs. The same relation characterized company B but in addition its machinery was greatly speeded up during these years by a number of small improvements. As a result, with volume below the 1936 average, direct labor costs in 1938 averaged only 6 percent above those of 1937 although wage rates were 19 percent higher. The effect of the difference in volume was reflected more fully in indirect labor costs, which were 14 percent above the 1936 level.

LABOR COSTS AND TOTAL COSTS

Wage rates are only one of the elements determining labor costs; labor costs are in turn but one of the factors comprising total costs of production. A limited degree of correspondence has been observed between trends in wage rates and in labor costs in the plants studied, but there is little if any such correspondence between wage rates and total costs, even with regard to the direction of change.

In none of these industries were labor costs of outstanding importance in explaining changes in total-production costs, particularly over the limited periods of time for which data were available. The ratio of labor costs to total costs per unit varied from around 12 percent in the paper plants to 30 to 40 percent in the textile company. Nevertheless, the role of labor costs is of strategic importance, particularly during periods of recession, since they often constitute the one element of cost which is within the control of the individual producer to any important degree. Efforts to bring prices and total costs into profitable relation with each other often involve attempts to adjust wage rates as the only practicable method of altering total production costs. In addition, of course, labor costs can also be influenced by changes in technology.

For the purpose of general analysis, the total costs of production may be considered as comprising three major elements—labor, materials, and “overhead” or “burden.” These factors are governed by very different influences and the relative importance of each varies widely for different industries and plants, and even from time to time within a given plant. The change in the proportions of these factors between 1929 and 1933 for one implement produced by the International Harvester Co. is an illustration:

Percent distribution of total costs

	1929	1933
Productive labor.....	14	7
Materials.....	52	31
Overhead (including sales and factory overhead).....	34	62
Total.....	100	100

The lack of correspondence between trends in labor costs and in total costs is particularly evident during periods when the general level of business activity is changing rapidly. As demand falls and production is curtailed, raw-material prices also decline and wage rates often are cut. At the same time, however, overhead costs per unit of output usually increase because fixed costs must be spread over a smaller number of units. During recovery the reverse situation occurs; raw materials and labor costs advance while the increased volume of production results in sharply lower unit-overhead costs. It is this inverse relation between trends in direct labor-and-materials costs and in unit-overhead costs which renders the relation between changes in labor costs and in total costs almost unpredictable. The character and relative importance of overhead costs is clearly a critical element.

In this respect, the present series of studies disclosed a variety of situations. In the International Harvester Co., wide fluctuations in volume and consequent changes in unit overhead were of outstanding importance. Increases in unit overhead caused the total season's factory cost of production to rise between 1929 and 1933 for every one of the products studied by amounts ranging from 13 to 80 percent, even though labor costs and prices of materials purchased in the open market were concurrently falling. From 1933 to 1937, on the other hand, season's factory costs were reduced by from 1 percent to 43 percent for selected models although wage rates and raw-material prices were rising.

The several shoe plants studied illustrate the opposite extreme. Due to the fact that machinery is not purchased but rented, with royalty payments depending upon the number of units produced, fixed costs are of minor importance. In effect, the burden of fixed plant overhead is shifted from the shoe manufacturer to the United Shoe Machinery Corporation. Since fixed costs in this industry vary with the number of units produced, and raw materials and labor costs are flexible, total unit costs fall sharply during depression and rise during periods of recovery.

The paper and textile plants represent an intermediate situation. Fixed overhead is an important element in cost, but not as large as in

the International Harvester Co. Moreover, changes in the volume of production in both of these industries have not been as great as in the agricultural implement industry, and consequently unit overhead has not fluctuated as widely.³

Nevertheless fluctuations in overhead cost per unit are of great importance to the paper companies. The margin of profit in both the paper and cotton-textile industries is largely determined by the level of labor and overhead costs per unit since the prices of the raw materials and the finished products move together. However, in the paper industry overhead costs are substantially larger than labor costs per unit, while in cotton textiles the reverse is true. For this reason the maintenance of volume in order to keep unit overhead costs down assumes an importance to these paper companies substantially greater than in the case of the cotton textile companies.

In the International Harvester Co. changes in the costs of materials were not very great during the period studied. Between 1929 and 1933, for example, materials costs for most of the products studied changed by less than 10 percent, and during the recovery period, from 1933 to 1937, changes were small except for implements in which radical changes in models were made. This relative stability was due to two factors. In the first place, the prices of many of the materials which enter into agricultural implements, such as steel, have not varied as widely as those for cotton and leather, for example. The International Harvester Co. produces many of its own materials and parts, the cost of which, as reported in the company's accounting system, include substantial items of overhead for the plant utilized in their production. Those overhead charges, on a unit basis, naturally rose as production declined during depression and were reduced as production increased during recovery, thus offsetting to some degree the declines in prices of materials bought in the open market up to 1933 and their rise from 1933 to 1937. The net result was an apparent stability of computed materials costs due to the fact that these opposing changes were of approximately the same order of magnitude. Consequently, although materials constituted a very substantial element in total costs (ranging from 40 to 60 percent during 1937 for most of the implements studied), changes in materials costs were of minor importance.

In each of the other plants surveyed—paper, shoes, and textiles—fluctuations in costs of materials were of primary importance in explaining changes in total costs. In all of these concerns raw materials constituted approximately one-half of the total expenses of production. The prices of the raw materials used in these industries—pulp, cotton, leather—are very flexible; that is, unlike steel for example, they change rapidly and widely with altering demand and supply conditions. As a result there has been a close relation between changes in materials costs and in total production costs; changes in materials costs were, in each case, the primary element causing variations in production costs.

In summary, labor costs were not the primary factor in causing changes in total production costs in any of the plants studied. Their influence was overshadowed in the International Harvester Co. and

³ The reasons for the greater stability of volume in the paper, textile, and shoe industries, as compared with the agricultural implement industry, are complex. Differences in the nature of the product and its markets are of basic importance, and differences in price behavior may also have been a contributing factor.

in the paper companies by overhead costs and in the other plants by materials costs.

COSTS, PRICES, AND PRICE POLICY

Again, the relation between costs and prices is not a simple one. Costs influence prices, but prices also affect costs, since volume is partially dependent upon price; and unit overhead, in turn, is dependent upon volume. The extent to which changing costs are related to prices depends upon many factors, such as the ability of the individual concern to establish and maintain an independent price policy or to control the various elements in its cost of production, the extent to which changes in price will actually affect sales, and so forth. Moreover, these conditions themselves vary from time to time with the general market situation; the situation existing during periods of expanding business activity may be very different from that when sales and production are falling.

Thus this survey suggests that when sales are falling, businessmen commonly regard themselves as being forced to lower costs to conform to reduced prices and that, when business is improving, they think of prices as being raised to conform to higher costs. During periods of recession, there is likely to be a buyers' market both for the products of the company and for its purchases of raw materials and its negotiations with labor. Prices for the finished product are, perforce, reduced, although the extent of the reduction may depend to some extent upon the ability of the individual concern to maintain an independent price policy. Price reductions, in turn, lead to pressure upon costs and to efforts to reduce those items of cost which are most readily controllable. In the shoe plants, for example, it seems to have been possible to achieve economies in raw materials by bargaining with leather manufacturers and, on occasion, by changes in the quality of the product. Each of the concerns studied cut wage rates during a period of declining business activity in the effort to reduce labor costs or in order to conform to the policy of competitors or of industry generally. Both of these motives seem to have been significant. Presumably the pressure upon costs is most acute when a prolonged period of falling sales impairs a concern's cash balance or its solvency. Under such circumstances officials of the paper mills, for example, stated that wage cuts were almost inevitable.

During periods of expanding business, the situation is reversed and rising costs exert their influence upon prices. There is a seller's market for materials, for labor, and for the product. Material costs rise as competitors bid against each other for supplies, and wage rates advance as the labor market becomes more active. Efforts are then made to keep prices in line with these advances in cost.

In periods of rapidly changing business conditions, the importance of the psychology of a market situation should not be minimized, since the point of view of businessmen obviously exerts a very important influence upon market trends. In such situations it cannot be too strongly emphasized that the relation between costs and prices is not direct, mechanical, or exact. The cost structure of a concern and the condition of its markets establish certain limits within which decisions must be made, but within these boundaries there may be a broad field for the exercise of individual judgment.

The International Harvester Co., because of its large size and historical position in the industry, has achieved a considerable degree of consumer acceptance for many of its products. Furthermore, it is an example of a company which manufactures lines that frequently have special features, which, together with the general acceptance of its products, makes it possible to charge somewhat higher prices for some products.

Of the other companies discussed in this report, company B in the paper industry has also achieved a limited degree of independence in its pricing because of the specialized nature of its output, and the consequent reluctance of its customers to shift to other sources of supply in order temporarily to obtain a slightly better price. Company Y in the shoe industry, as the "price leader" for its grade of product, similarly enjoyed some latitude in its price making. The textile industry illustrates the opposite extreme, in that the price of grey goods is largely determined by the impersonal forces of the market and is out of the control of any individual producer.

In another report prepared by the Bureau of Labor Statistics for the Temporary National Economic Committee,⁴ it was suggested that business executives usually work toward some degree of price stability and that for a number of reasons they prefer to avoid reducing the prices of their products sharply during a period of curtailed demand or of raising prices too sharply when demand increases. The International Harvester Co. affords an example of this type of policy operating in a situation in which a certain degree of freedom in determination of policy could be exercised. Based on their belief that moderate changes in price would not appreciably affect sales because of the low level of farm income, this company, like other companies in the same industry, did not make any substantial price reductions during the period 1929-33. Of course, actual costs per unit increased during this period because of rising overhead per unit, as volume declined. Price changes, however, did not reflect closely these changes in costs, even changes in "normal" costs, which were computed on the basis of an assumed normal volume of output. There were deviations in both directions from changes in "normal" costs in the case of different products.

This lack of any closely defined correspondence between changes in cost and changes in price was characteristic of most of the plants studied. Probably the closest relation was displayed by the union plant of shoe company X where fixed costs are very small; however, even in that case there were substantial divergences in trend. In the nonunion plant of the same company, the cost-price relation was much less direct. On the basis of this very limited group of concerns it appears that businessmen tend to overstress the importance of costs in relation to their decisions on prices.

Thus, these studies emphasize the complexities surrounding business price policies and the relations of prices to costs. Each industry, each concern within an industry, and even individual plants in a single concern, faced different problems and adopted different policies for their solution. The only generalization possible is that costs have an obvious influence upon prices, and prices in turn upon costs; the character of the relation in any individual case and at any specific time must be individually appraised on the basis of all the attendant

⁴ See Monograph I, Price Behavior and Business Policy.

conditions. Needless to say, this leaves the effect of wage rate changes on prices even more indirect and remote. It appears to be more usual for price changes to bring about wage changes.

TECHNOLOGICAL CHANGES

Technological change may take place by improving tools and machinery, plant layout, production methods or product design. This inquiry attempted to secure information about the process by which these changes were decided upon, and in particular the importance of changes in wage rates in stimulating the rate at which they were adopted. In most industries the period of time covered was too short to permit a satisfactory description or analysis. Although certain conclusions may be drawn from the experience of these companies their general applicability is open to question.

To many people "technological change" suggests major developments that revolutionize the techniques of production. This is probably not as important in the general picture of changes in the productivity of labor as is popularly supposed. Few major changes in techniques were made by these companies during the years studied, certainly none that could be considered revolutionary. Major reductions in cost were accomplished in several instances, but they were the cumulative result of many minor improvements. To the extent that a succession of minor changes is responsible for a substantial share of technological change, more continuous scrutiny and more detailed calculations may be required to appraise their effects.

In these companies technological change was not only a matter of small improvements but of constant effort to reduce costs and to improve quality. There was no evidence that a sharp increase in wage rates started a wave of technological changes designed to reduce labor costs. Rather, methods of reducing costs were the subject of continuous study in most of these companies, and more often than not the principal savings were in overhead and materials costs rather than in labor costs.

Decisions to make technological changes which involve only a small expenditure are usually made by operating officials such as the plant superintendent. If a large expenditure is required, the officers of the company make the decision, although in some cases the board of directors must also approve. Many considerations enter into each decision, but the most important are the net cost of the change, the effect on the product, and in some companies the effect on labor. Different methods were used to compute the expenditures and the estimated savings involved in a change. Further inquiry into the accounting procedures used by large and small companies and companies in different industries in estimating such savings should have great value. The International Harvester Co. multiplied estimated savings per unit of output by a forecast of production. The result was a considerable stimulation of investment in new techniques during periods of expanding sales when prospective output was large, rather than in times of declining production.

Major improvements in the product, designed to improve its quality or reduce costs of production, are more likely to be made when the sales outlook is good. Major technological changes in machinery and layout are most often made when an entirely new model is being

brought out. This was true, for example, in the case of the new model tractors introduced by the International Harvester Co. in 1939.

The effect on labor was an important influence on the timing of technological change in both shoe companies. Company X agreed with its employees that the automatic heel seat laster would be introduced in plant 2 only as rapidly as normal turn-over and expansion of output could absorb the displaced workers. Three years after the first installation only about half of the plant production was being handled on this machine. Company Y made a somewhat similar arrangement for taking care of employees displaced by the automatic heel seat laster. These two companies illustrate the possibility of making adjustments to diminish the hardships to individual workers occasioned by the installation of new machines.

Decisions on technological changes of one sort or another were made nearly every day by most of the companies in their constant effort to reduce costs and improve the competitive position of their product. Savings in labor costs, overhead costs, or materials costs were important inducements to adopt such changes, but the improvement of the quality of the product and the effect on employees were also significant factors in several instances.

INDUSTRIAL WAGE RATES, LABOR COSTS
AND PRICE POLICIES

A Series of Case Studies
PART I

COMPANIES IN THE SHOE, PAPER, AND
COTTON TEXTILE INDUSTRIES

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UNITED STATES DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
Temporary National Economic Committee Studies Section

PART I

PREFACE

Part I presents the results of an exploratory inquiry into the experience of companies in three industries. The scope of the problems to which attention was directed has been limited by the time available, and those particular questions were selected which seemed most relevant to the issues upon which the Bureau of Labor Statistics is reporting to the Temporary National Economic Committee. These are described in the first section of the introductory chapter, which also summarizes the results of the investigations in all four industries, including, in addition to those reported upon in part I, the agricultural implement industry, which forms the subject matter of part II. This summary was prepared by the authors in consultation with Edward S. Mason and Arynness Joy.

The field investigations upon which part I is based were carried out and individual reports were prepared by members of the industrial relations section of the Massachusetts Institute of Technology, under the general direction of W. R. Maclaurin. Charles A. Myers was primarily responsible for the material on the shoe industry; John A. Brownell, with the collaboration of W. R. Maclaurin, for that on the paper industry; and Douglass V. Brown for that on the cotton textile company. These reports were purchased by the Bureau of Labor Statistics for submission to the Temporary National Economic Committee and edited by Douglass V. Brown and Edwin M. Martin, assisted by John T. Dunlop. Saul Nelson also assisted in the final editing of the entire volume.

Since the companies cooperating in the studies appearing in this volume preferred to remain anonymous, every effort has been made to conceal their identity. Grateful acknowledgment is made to the many persons in the different firms who gave freely of their time in providing the information contained in these reports. Without their complete cooperation it would not have been possible to carry out the inquiry.

CHAPTER I

THE SHOE INDUSTRY

The shoe industry was selected to illustrate the problem of a large industry manufacturing finished articles widely purchased by consumers. Data were obtained from the officials of two shoe companies, both of which had quite complete cost records.

In two respects the shoe industry is in a somewhat unique position with respect to its costs. Since nearly all men's shoemaking machinery is rented from the United Shoe Machinery Co. and paid for largely on the basis of volume of output, shoe companies have relatively small fixed depreciation charges. Changes in the volume of business done affect costs per pair of shoes less than unit costs in other industries which use more orthodox methods of charging for their equipment.

Nevertheless, factory costs per pair of shoes fluctuate widely, due to the variability of leather prices and to the importance of leather in costs. Leather represents from 50 percent to 60 percent of the factory cost of the shoes made by the two companies studied. The wide variations in leather prices, which roughly parallel changing demand for shoes, together with the relative unimportance of fixed costs, result in greatly reduced costs per pair when business is poor, and there is pressure for price cuts. On the other hand, leather prices and, hence, total costs of making shoes are higher when business is good and it is easier to increase prices. This situation greatly simplifies the pricing problems of these shoe companies.

In the two firms described in this report, prices and costs have moved very closely together over the period 1931-39. In periods of declining business, costs have usually been brought into line with the price level considered necessary for maintaining volume of sales and of production by putting pressure on suppliers of materials and by wage cuts.

Leather prices have usually increased when business was expanding and when price increases for shoes required by higher material costs were possible. It is at such times that wage increases are usually made. Wage policy has been largely subordinated to considerations of price policy.

Company Y has formulated its wage policies with a general regard for the general business situation but with very little specific consideration of the actions of other shoe companies. Company X has followed a somewhat similar policy in one of its plants (plant 2) although with rather more attention to the wage policies of nearby shoe companies. In its other plant (plant 1) company X follows closely the wage policies agreed upon by the shoe workers' union and the manufacturers' trade association in a large nearby city.

In general, changes in wage rates have been followed in both companies by proportionate changes in labor costs per unit. Changes

in the volume of output affect day-labor costs, but these are only a small part of total labor costs. No technological changes which were made during the years covered had an appreciable effect on unit labor costs.

Improvement in quality has been an important objective of the technological changes made by these companies in recent years. The one change which reduced labor costs appreciably was introduced slowly to permit transfer and retraining of displaced workers.

INTRODUCTION

The manufacture of boots and shoes has been transformed from handicraft to machine operations in the last hundred years. However, the making of shoes is still a semiautomatic process, subdivided into thousands of detailed operations. "In practically all cases, the machines seem to have been devised to imitate as closely as possible the motions and operations formerly performed by the expert shoemaker at his own bench."¹ Shoe machinery is an improvement over hand tools because it helps the worker to do a job faster or better than by hand, but the machine must be guided by an operator with skill and judgment.

Starting with the McKay machines, introduced in the 1860's to sew the soles to the uppers of the shoes, the policy of leasing shoe machinery on a royalty basis has become a fixed feature of the industry. At the present time most shoe machinery is leased from the United Shoe Machinery Corporation, which follows the policy of charging similar royalties or rentals to all manufacturers of shoes irrespective of size or location.

According to the Bureau of the Census, the boot and shoe industry, excluding rubber shoes, was composed of 1,080 establishments employing on the average 215,438 wage earners during the year 1937.² The industry spent \$191,000,000 in wages to manufacture product valued at \$768,000,000. Approximately one-half the wage earners in 1937 were concentrated in the States of Massachusetts, New York, and Missouri, in that order of importance.

Average hourly earnings in the shoe industry have been below the average for all manufacturing industries and, in the nonrubber sections

¹ Labor Productivity in the Boot and Shoe Industry, Monthly Labor Review, February 1939, pp. 271-292.

² The industry, excluding rubber shoes, is defined by the census as including the establishments whose principal products are "boots, shoes, sandals, slippers, moccasins, and allied footwear, and leggings, overgaiters, etc., made chiefly of leather but to some extent of canvas and other textile fabrics." The following table summarizes the Census of Manufactures reports on the boot and shoe industry (excluding rubber shoes) for recent census years.

	1929 ¹	1933 ²	1935 ²	1937 ²
Establishments	1,341	1,132	1,024	1,080
Wage earners (average)	205,640	190,914	202,113	215,438
Wages	\$222,408,000	\$142,054,000	\$172,349,000	\$191,305,000
Cost of materials	\$515,055,000	\$286,303,000	\$333,799,000	\$416,305,000
Value of products	\$965,923,000	\$553,425,000	\$643,872,000	\$768,327,000
Value added	\$450,867,000	\$267,122,000	\$310,073,000	\$352,022,000

¹ Fifteenth Census of the United States, 1930; Manufactures, 1929, vol. II; Reports by Industries, p. 802.

² Biennial Census of Manufactures, 1937, pt. I, p. 806.

of the industry, materially below the average for all nondurable goods industries.³

Labor costs usually constitute between 25 and 30 percent of total factory costs, depending on the style and type of shoe. Materials costs, primarily leather, are much more important, ranging from 50 to 60 percent of total factory costs.

In the shoe industry it is customary to regard the year as divided into a fall and spring season. The emergence of styles in both men's and women's shoes, particularly since the World War, has made these seasons even more marked. Each season can be regarded as a planning period for which the manufacturer formulates his production schedules, raw material orders, labor requirements, and probable sales volume.

It is customary for firms, or at least plants of a firm, to concentrate production on either men's, women's, or children's shoes. A further form of specialization is with respect to the grade of shoe. Shoes may be classified in various ways on the basis of grade as measured by selling price. For the present survey, three price ranges may be distinguished: (a) Cheap shoes, retailing at \$2 or less, primarily for women and children; (b) medium-priced shoes selling at \$3 to \$5 a pair at retail; and (c) high-grade men's and women's shoes retailing for over \$5 a pair. Within each main group there are "price lines" which have remained relatively constant over a period of years, that is, customary retail and whole-sale prices which consumers have come to accept. These divisions of the industry must be kept in mind because each type of plant or firm has problems peculiar to itself. For instance, it is sometimes said that the effect of a wage increase on the firms manufacturing \$2 shoes would be to cheapen materials or construction, since price lines cannot be readily changed. Just the opposite appears to be the case with respect to high-grade shoes for which price lines are less important; the quality of materials and construction remains unchanged and prices are raised.⁴

A few important firms manufacturing shoes own or control their own retail outlets, although most manufacturers sell to wholesalers and jobbers or to large retail shoe chains.

The firms having their own retail outlets enjoy a number of substantial advantages. Primarily, these are based on their ability to plan their production with a great deal more assurance and efficiency than can concerns selling through independent distributors.

The firms which cooperated in this survey will be identified as company X and company Y. Company X manufactures high-grade men's shoes in one of its plants, and a lower-priced but still high-grade

³ The average hourly earnings for certain industrial classifications, 1935-38 are given below as compiled by the Bureau of Labor Statistics and published in February 1940 in a mimeographed release, "Hours and Earnings in Manufacturing and Non-Manufacturing Industries, 1932 to 1939."

	1935	1936	1937	1938
Boot and shoe (leather)	51.2	49.8	51.5	49.7
Boot and shoe (rubber)	52.3	52.3	59.0	60.2
Total manufacturing	55.9	56.4	63.4	63.9
Nondurable goods manufacturing	53.8	53.7	58.5	59.3

⁴ See below the section on "Wage Rates, Labor Costs and Prices" for a discussion of the actual relation between wage-rate changes and price policy in the two companies surveyed. For a discussion of the practice of "price lining" see Monograph No. I, "Price Behavior and Business Policy," Appendix II.

men's shoe in the other, which is located in a different State. Employees of the higher-grade plant are unionized while the "out-of-State" plant is operated as an "open shop." These will be referred to hereafter as plant 1 and plant 2, respectively. Company Y's operations were surveyed in considerably less detail. It has several plants, operated as "open shops," in which medium-priced men's and boys' shoes are produced. Both firms have total assets of between 3 and 7 million dollars and can be regarded as medium-sized firms in the industry. Employees of both firms receive average hourly earnings materially above the average for the industry. Because of the highly diverse conditions in the industry, both as to types and grades of shoes made and as to management policies with respect to prices and labor, extreme caution must be exercised in applying to the industry as a whole the conclusions derived from the experience of these two firms.

The wage rate, cost, and price data for both company X and Y presented in the following pages apply to a similar type of shoe manufactured by both companies: a plain, black-calf, man's oxford shoe. The shoe manufactured at plant 1 of company X is of better quality than that made at plant 2, and both are higher grade shoes than that selected in company Y. However, the records for each plant are for a shoe which was changed relatively little in the period for which data were secured.

THE FORMULATION OF WAGE POLICY

Data have been secured on general wage-rate changes made by company X in the years 1931-39 and by company Y from 1936 through 1938. During these years there have been a number of plant-wide percentage changes in piece rates and in hourly rates, as well as frequent readjustments of individual piece rates. The general changes in piece rates are of greatest importance since piece-rate charges represent around 75 percent of direct labor costs in company X, and about 90 percent in company Y. Changes in hourly rates are usually made at about the same time as general changes in piece rates. In company X there was one reduction in weekly hours of day workers without any change in normal weekly earnings, resulting in a substantial increase in hourly earnings. The general changes made by company X and by company Y are shown in tables 1, 2, 3, and 4.

Company X, plant 1.—In recent years wage-rate changes in plant 1 of company X, a unionized plant manufacturing a high-grade shoe, have followed those made by other shoe manufacturers in the region and, in this sense, there is no independent wage policy in the plant. In this region wage-rate changes are usually made first by members of a trade association composed of shoe manufacturing concerns in a nearby urban area. Wage-rate changes negotiated between the shoe workers' union and the members of the trade association later spread to the nonmember shoe firms in the surrounding communities, of which company X is one. If the trade association members have granted a wage increase, "we know that soon the union will be around to us," explained an official of company X, and "if the union has agreed to a wage cut in their plants, we think it's about time for us to put in a request."

Union organization in the area is perhaps the chief explanation for the adoption of similar wage policies throughout the region, but employer pressures also play an important part. As an executive of

company X put it, if one employer voluntarily increased wages in a situation which was not generally accepted as justifying an increase, "the other manufacturers would be angry, so we must follow the group pretty much." "Following the group," is facilitated in the shoe industry by the fact that the material costs and the sales prospects of manufacturers tend to change in similar fashion.

Although apparently guided largely in the timing of wage-rate changes in its unionized plant by the changes made by other shoe concerns in the neighborhood, company X says that it has relatively little information on the details of the wage agreements between the union and nearby companies at present. It appears, however, that the wage rates of plants located in the largest city of the region are 5 to 6 percent higher than those of workers employed in the surrounding smaller cities.⁵

Company officials state that, with one important exception, they know even less about the wages paid by principal competitors, most of whom are located outside this region. The exception is notable, however, in that company X and its closest competitor exchange information on costs, production problems, and wage scales, on the basis of which it is stated that wage rates and labor costs for company X are about 8 percent higher than those of this competitor on comparable types of shoes. According to the controller of company X, it can compete despite this differential because of better workmanship by its higher paid employees and because of the reputation which its branded product enjoys among consumers who continue to buy it even if it may cost a few cents more than a competing shoe of the same general class.

The wage policy of company X in plant 1 is thus related more closely to the actions of nearby shoe concerns, which do not sell in direct competition with it, and to the requests of the union to which its employees belong, than to the wage policies of companies producing a comparable and competing product.⁶

Company X, plant 2.—A somewhat more independent wage policy has been followed by company X in its nonunion plant, plant 2. According to the company, wage increases have been granted to employees of plant 2 before other shoe workers in its neighborhood received increases, and reductions have been made later. Shoe factories in this area are not extensively unionized, and in these circumstances the company prefers not to have its plant organized, in order to avoid the higher costs which it believes would be associated with union organization, and which would make competition difficult in the lower price high-grade shoe market.

However, the amount of the wage rate increases at plant 1 has been uniformly somewhat greater than at plant 2. Since 1933, net piece rate increases at plant 1 have totaled 25 percent, compared to 17.5 percent at plant 2. Company officials agree that the union organization at plant 1 was an important factor in this difference. They also believe that the wage rates in plant 2 at the beginning of the period were higher than those paid by other shoe firms in the vicinity, while the wage rates in plant 1 were somewhat lower than those

⁵ According to an official of company X, the differential is to be explained by the steadier work provided by the firms in the surrounding towns.

⁶ This conclusion is also supported by the fact that in 1938 when the union plant resumed the manufacture of a medium-price shoe, made only at the nonunion plant before 1933, it was found necessary to pay substantially higher piece rates to the union workers, though the company believes that even the non-union employees receive more than workers of other companies on competing grades of shoes.

paid by many other firms in the nearby urban community and about equal to those in its neighborhood. As a result there was relatively less pressure for increases in plant 2.

Union organization, or the threat of union organization, and the actions of neighboring shoe firms are important general considerations governing the wage policy of company X. However, the amount and the timing of particular changes in both of its plants is affected by a number of other factors. The profits of the company, as measured by earnings per share of common stock, are an important guide to wage policy. The management is accustomed to consider that certain profit rates are "good," while others are deemed "moderate," and "poor." "Good" profits incline the executives to look with favor on requests for wage increases; on the other hand "poor" profits suggest the need for wage cuts.

The general trend of shoe prices is also given weight in considering wage changes, according to company officials. Anticipation of price cuts by competitors may stimulate an effort to cut the company's costs in advance, including its wage costs so as to be in a favorable position to counter with price cuts of its own. Similarly, if selling prices are rising throughout the industry, the prospects for the granting of a wage increase will be favorable.⁷

The controller of the company states that, in the long run, what "labor is believed to be worth to the employer" must enter into his wage policies. But in the short run, in the day-to-day conduct of business it is not an important consideration, largely because it is not readily measured nor easily brought into wage negotiations.

For both plants of company X, final decisions affecting general wage rate changes are made by the president. First contact in a union demand for a wage increase is usually made with the plant 1 superintendent, who handles labor relations in addition to directing production. If the issue is more important than a minor readjustment in an individual rate, the superintendent refers the matter to the president. Before making a final decision, the latter may discuss the proposal with the company directors, most of whom are officers of the company and in daily contact with each other. In plant 2, the president and the plant superintendent handle wage and labor matters in similar fashion.

Company Y.—The wage policies of company Y are unusually independent, determined with relatively little regard to those of neighboring employers or of its competitors. Its plants are all on an "open-shop" basis and negotiations with employees are seldom involved in its decisions on general wage changes.

The level of piece rates paid by company Y is, in general, lower than that paid by many shoe companies making competing shoes in the same region, but the hourly and weekly earnings of its employees tend to be higher than those of employees of nearby plants. Company Y provides its employees with an unusually steady flow of work. This is made possible partly by its large size and relatively standardized output, which permit it to specialize on certain types of shoes in each plant. This saves the interruptions involved in changing over from one style or size of shoe to another. Moreover, company Y has unusually efficient plant layouts which insure a rapid and smooth

⁷ For a further discussion of the relation between price policy and wage policy, see below p. 16-22.

flow of work. High average hourly earnings are also due in substantial measure to the minimum output standards set by the company for its employees.

Company Y states that it competes for labor by the promptness of its wage increases and the lateness of wage decreases, and by organizing its operations in such a way as to provide high hourly and weekly earnings, even though piece rates and unit labor costs are kept low.

It is the announced policy of the company "to be among the first in the industry to increase wages and among the last to decrease wages." Reasons for this policy, as expressed by company officials, include the interest of the company in the relatively high level of workers' weekly and annual earnings, and the desire "to remain an open shop," to secure a higher quality of employees, and to reduce labor turn-over. This independent policy is facilitated, in the opinion of the company, by the fact that it is a price "leader" in the industry. According to its president, its prices fluctuate with changes or anticipated changes in costs, without close consideration of prices currently being charged by its competitors.

Decisions on wage-rate changes rest jointly with the president, treasurer, and the two vice presidents of the company. They act on the basis of general data regarding the company's operations and broad economic trends. According to executives, wage increases are made when it is believed that the situation will permit a price increase, and usually at a time when such an increase is also required by rising materials costs. Being a price "leader" rather than a "follower," the company can afford to make these changes earlier than other companies. Wage decreases are made, according to the president of company Y, when the company and the whole business community feels the pressure of falling prices and declining sales on rigid costs. The thought is "in the air" that costs must be cut, and among them wages. Company Y is frequently able to put off wage cuts longer than its competitors not only because of its relatively independent price policy but also because of its strong financial position.⁸

WAGE RATES, LABOR COSTS, TOTAL COSTS, AND PRICES

This section describes the way in which changes in wage rates have affected labor costs and the relations between labor costs, total costs, and price in the period 1931-38.⁹ The discussion will be centered on the experience of company X; a less extensive study has been made of company Y. A brief description of the cost accounting systems of companies X and Y is a necessary introduction to an analysis of the impact of wage changes on labor costs, total costs, and prices.

Accounting Procedures.

Company X.—Company X has operated on a standard cost system for nearly 10 years. The purpose of these standard costs is twofold: (1) to enable the company to establish a selling price based upon estimated costs, and (2) provide a standard for comparison with actual performance.

⁸ For a more extended discussion of the price policy of company Y and its relations to wage policy, see below, pp. 20-22.

⁹ It is not possible in the plants in the shoe industry covered by this survey to compare changes in wage rates with changes in average hourly earnings as has been done for the other industries included in this study. Earnings data are only available on a plant-wide basis, while wage rates are frequently changed by different amounts for different classes of employees. Moreover, about 75 to 95 percent of the employees in the shoe industry are paid on a piece-work basis, and it is difficult to keep accurate records of the number of hours worked by these employees.

A budget is drawn up for each 6-month season. The first step is to prepare an estimate of sales from figures provided by salesmen, checked by the sales manager, stock department manager, and president. A production schedule is then prepared for both contract and stock shoes, with a view to keeping the plant operating on a steady month-to-month basis.

Material costs are figured from a standard estimate of leather required for each type of shoe based on figures supplied by a subsidiary of the United Shoe Machinery Co. These materials are priced for the cost budget at a weighted average of the price of stock on hand and the expected cost for the additional quantity required during the next season. Labor costs are built up from piece rates on particular styles and makes of shoes, to which is added an allowance for labor paid on an hourly or day basis.

The labor cost catalog contains over 25,000 piece prices for the various operations needed to manufacture all styles and grades of shoes, as well as the standard day work allowances by departments.¹⁰ The latter are computed by dividing the estimated day work pay roll for each department by the estimated average production. To arrive at a per-pair labor cost figure by departments for any style of shoe, the piece prices of the operations called for by that style are added to the standard day work allowance for each department.

The other per-pair costs are figured from the production budgets prepared earlier. The manufacturing expense allowance per pair is calculated by dividing the total budgeted manufacturing expense by the estimated volume of production in number of pairs. The selling and administrative expense allowance is expressed as a percentage of the selling price, a percentage computed as the ratio of budgeted selling and administrative expenses to budgeted dollar sales.

Royalty and rental costs per pair, which are the charges for machines leased or rented from such companies as the United Shoe Machinery Corporation, are computed along with other items in manufacturing constant by dividing the estimated charges, including rentals (on a time basis) and royalties (on a per-pair basis), by the budgeted production. Other costs, such as commissions and discounts, are expressed as percentages of the factory selling price of the particular shoe.

Standard factory costs (labor, materials, and manufacturing expenses) usually remain unchanged throughout each season, and differences which may develop between actual and standard costs are reflected in monthly "variation reports." If shoe prices are changed in the middle of a season, the other standard cost items such as commissions, discount, selling and administrative expense which are all computed as a percentage of selling price, are refigured. At the

¹⁰ "Day work" includes direct labor on operations where piece rates have been found unsuitable, and in direct labor such as the boys who assist piece workers in actual production and those who look after the repairing of damaged shoes. Other indirect labor, such as rack pushers, janitors, and other maintenance men, is included in "manufacturing expense."

For the sake of simplicity in calculation and because it is relatively unimportant, the labor cost included in "manufacturing expense" has not been taken out and added to the other labor costs already listed on the standard cost sheets. Mechanical and general labor of this character is, however, seldom more than 10 or 15 percent of the total figure for "manufacturing expense." It is true that an increase in wages would affect this labor as well as so-called productive labor, but the net effect of, say, a 10-percent wage increase, would be between seven-tenths and eight-tenths of a cent per pair at the most, and hence unimportant in the total picture.

The same point applies to Social Security taxes, which are included in manufacturing constant. They would increase in the aggregate with an increase in pay roll due to a wage increase. The standard costs allowance per pair remains unchanged, however, except when there is a change in the tax rate.

beginning of the next season, all standard costs are recomputed in the light of changed market and labor conditions.

There is thus a lag between the time that wage rate changes are made and the time that they are reflected in standard costs. These costs are figured for the spring season no later than about December 12 of the previous year, and for the fall season no later than June 12. A wage change in July or August, therefore, would not appear in standard costs until they were figured in December for the following spring. This should be borne in mind in the discussion of the repercussions of wage changes on costs.

Standard cost figures computed in this way are presented in the following pages for piece-rate labor costs, total labor costs, total materials costs, manufacturing constant, and total manufacturing costs. Data were secured for each season from 1931 through 1938 in plants 1 and 2 of company X.

Company Y.—In company Y "standard costs" per pair for the basic styles of shoes are also calculated at the beginning of each half-year production season.¹¹ Standard costs for the fall season are computed in June of each year, and for the spring season in December. Great reliance is expressed by management in these cost figures, both from the standpoint of price setting and as a yardstick of operating efficiency. The president of the company stated that if the variation between figured standard costs and actual costs were more than 2 or 3 percent (except in unusual and explainable cases, such as a change in prices of materials or labor) they would consider their cost system a poor one.

The following standard costs (for the selected shoe) were furnished by the company for each production season in the years 1936-38:

1. Total costs—the total of all standard costs, factory as well as selling, administrative, advertising, etc.

2. Materials costs—including upper leather, sole leather, lining and cloth, and findings and cartons.

3. Productive labor costs—defined as costs associated directly with the actual productive process. They are 97-98 percent piece-rate costs, with only a very little day labor included. Most day work falls in "miscellaneous costs."

4. Miscellaneous costs—all remaining costs except charges for royalties and rentals on machines. These include, for instance, "departmental labor" (such as foremen, superintendents, and other "indirect" day labor); manufacturing expense (i. e., overhead or factory burden); lasts, dies, and patterns; samples; administrative, advertising, and general; Social Security taxes and other taxes; selling expenses; and a charge for damaged shoes.

5. Royalty and rental costs—charges for lease or rental of machines from United Shoe Machinery Corporation and other companies.

For executive use, these costs, particularly the "miscellaneous" items are broken down into simpler categories.

¹¹ Although the method used by this company to compute standard costs was not studied in detail, it is similar to that followed by company X.

Wage Rates and Labor Costs.

Wage-rate changes in company X and company Y have been followed with few exceptions by proportionate changes in unit costs. Changes in the volume of output have affected labor costs per unit, but not greatly since most workers are paid by the piece. There were no important changes during this period in the efficiency of either the workers, the machines, or the plant organization as a whole, which affected labor costs appreciably.

Company X.—Table 1 compares changes in the wage rates of employees working on the grade of shoe selected for special study in plant 1 of company X with each season's piece-rate costs per pair of shoes and with total labor costs per pair (excluding labor costs included in "manufacturing constant"). Each wage-rate change is accompanied by the standard labor-cost figures for the season which first took account of the change in the wage structure.

With the exception of the decrease of 4 to 8 percent in piece rates made in November 1931, each wage-rate change was reflected closely in the standard piece-rate and total labor costs per unit for the following season. Total labor costs per unit fell only 3.8 percent after the November 1931 cut of 4 to 8 percent in piece rates, and piece-rate costs only 1.2 percent. This difference was not attributable to any of the usual factors affecting labor cost.

In addition to the changes accompanying wage-rate increases and decreases, there were two 10-percent changes in piece-rate costs which did not reflect any general wage adjustments.¹² From the fall of 1932 to the fall of 1933 piece-rate costs increased 10 percent, and from the fall of 1934 to the fall of 1935 they declined about 10 percent, then rising again about 5 percent by the fall of 1936. These changes in piece-rate costs were due in large part to the shifting of certain operations from piece work to an hourly basis and vice versa. For example, the advance in piece-rate costs from 1932 to 1933 was accompanied by a small decline in total labor costs, indicating that there was an increase in the proportion of piece work to hourly work on this type of shoe. In 1934 and 1935 there were in addition sharp fluctuations in output due to transfers of the production of certain types of shoes between plant 1 and plant 2. Consequently the movements of piece-rate and total labor costs were somewhat irregular. Between the spring and fall of 1938 total labor costs rose by about 4 percent without any general change in wage rates and without as great a change in piece-rate costs. In this case a 14-percent drop in production increased the unit cost per pair for hourly labor. It is clear that there may be changes in both piece-rate and total labor costs without general changes in wage rates.

¹² See table 1.

TABLE 1.—*Piece-rate costs and total labor costs per pair, plant 1 of company X, selected shoe*

{1932 average=100}

Date	Index of piece-rate cost per pair	Index of total labor cost per pair	Date	Index of piece-rate cost per pair	Index of total labor cost per pair
1931:			1935:		
Spring.....	117.1	118.0	Spring.....	111.6	112.5
Fall.....	114.4	115.6	Fall.....	108.8	105.7
1932:			1936:		
Spring ¹	113.0	111.2	Spring.....	110.2	107.1
Fall ²	86.5	88.8	Fall.....	114.5	110.1
1933:			1937:		
Spring.....	(³)	(³)	Spring.....	114.5	111.6
Fall.....	95.4	87.3	Fall ⁵	119.9	116.0
1934:			1938:		
Spring.....	(³)	(³)	Spring ⁶	117.5	114.2
Fall ⁴	120.6	108.8	Fall.....	119.0	119.2
			1939: Spring.....	119.5	119.2

¹ Piece rates were cut 4 to 8 percent on Nov. 16, 1931.² Day rates were cut 10 percent on May 2, 1932, and piece rates 20 percent on May 31, 1932.³ Not available.⁴ Piece rates were increased 10 percent and day rates 20 percent on Aug. 14, 1933, and piece rates were increased another 10 percent on Feb. 12, 1934.⁵ Piece rates were increased 5 percent on Feb. 15, 1937.⁶ Piece rates were increased 4.75 percent and day rates 5 percent on Aug. 16, 1937, and cut by the same amounts on Nov. 8, 1937.TABLE 2.—*Changes in wage rates and labor costs, plant 1 of company X, selected shoe*

Date of wage change	Change in piece rates	Percent change in piece-rate costs, season to season	Change in hourly rates	Percent change in total labor costs, season to season
Nov. 6, 1931	Decrease of 4-8 percent.....	-1.2		-3.8
May 31, 1932	Decrease of 20 percent.....	-23.5	Decrease of 10 percent ¹	-20.1
Aug. 14, 1933	Increase of 10 percent.....		Increase of 20 percent ²	
Feb. 12, 1932	do.....	³ -26.4		⁴ +24.6
Feb. 15, 1937	Increase of 5 percent.....	+4.7		+3.9
Aug. 16, 1937	Increase of 4.75 percent.....		Increase of 5 percent.....	
Nov. 8, 1937	Decrease of 4.75 percent.....	⁵ -2.0	Decrease of 5 percent.....	⁶ -1.6

¹ The decrease in hourly rates was made on May 2, 1932.² Hours reduced from 48 to 40 per week with no change in normal weekly earnings.³ No cost data were available for the spring of 1934, so it is necessary to compare the 2 wage-rate increases with changes in piece-rate costs over the year from the fall of 1933 to the fall of 1934.⁴ This is again the increase in labor costs over the year period from the fall of 1933 to the fall of 1934.⁵ The increase of Aug. 16, 1937, and the decrease of Nov. 8, 1937, both took place within a single season. Hence the cost figures should not reflect either of them.TABLE 3.—*Changes in wage rates and labor costs, plant 2 of company X, selected shoe*

Date of wage change	Change in piece rates	Change in hourly rates	Percent change in total labor costs per pair, season to season ¹
July 6, 1931	Decrease of 10 percent.....		-4.9
May 20, 1932	Decrease of 12.5 percent.....		-13.4
Aug. 14, 1933	Increase of 15 percent.....	Increase of 2.5 percent.....	+19.3
June 1, 1935	Increase of 5 percent.....		+5.7
Jan. 22, 1937	do.....	Increase of 5 percent.....	+7.1
Mar. 15, 1937	Increase of 2.5 percent.....	Increase of 2.5 percent.....	+7.1
July 11, 1938 ²	Decrease of 10 percent.....		+3

¹ Change in total labor cost based on standard labor cost for season before wage change and for season following wage change.² Effective only if production remained above 200 pairs a day. During the spring of 1939 the cut was ineffective as production was below this level.

Total labor costs for the selected shoe in plant 2 of company X changed almost proportionately with the changes in wage rates, with the single exception of the wage decrease in 1931.¹³ In this case declining volume was partly responsible for the fact that unit labor costs declined only 4.9 percent, though piece rates were reduced 10 percent. Fluctuations in total labor costs during periods when wage rates were stable were not as great as in the case of plant 1. The largest change was a decline of about 4 percent between the fall of 1934 and the spring of 1935, probably due to increased volume.

Company Y.—In company Y unit labor costs followed the changes made in wage rates closely. (See table 4.) The single exception, an increase of only 5.1 percent in labor costs following successive wage increases of 4.17 percent and 6 percent, is explained by company officials as probably the result of an error in the computation of standard labor costs after the increase which apparently has been continued in the figures for succeeding seasons. In the short period covered there were practically no changes in unit labor costs that were not related to wage changes.

TABLE 4.—*Changes in wage rates and labor costs, company Y, selected shoe*

Date of wage change	Change in wage rates	Percent change in total labor costs per pair season to season ¹
Jan. 1, 1937	Increase of 4.17 percent.....	
Mar. 11, 1937.....	Increase of 6 percent.....	+5.1
July 7, 1938.....	Decrease of 8.57 percent.....	-9.2

¹ Company officials have suggested that the discrepancy between the amount of the 2 wage increases and the increase in labor costs was probably due to an error in figuring standard costs for the fall season of 1937 and succeeding periods. Such checks as could be made confirm this explanation.

In general, changes in the efficiency of workers or in the techniques of production have had little effect on unit labor costs in these companies during the years for which cost data were obtained. Volume of output has been of some importance but, on the whole, labor costs per unit have followed the changes made in wage rates closely.

Wage Rates, Labor Costs, and Prices.

In these two shoe companies wage-rate changes have not had any appreciable influence on price policy. Generally, when business is declining, prices are cut to meet competition and maintain sales, and costs are adjusted to permit a profit if possible. When sales are expanding the general practice is to advance prices to meet increases in raw materials costs which result from the augmented demand. Wage increases are usually considered only when price increases are in any event required by higher materials costs. There is no evidence that price advances were made primarily because of increases in wage rates and labor costs.

Since there was a close correspondence between wage-rate changes and short-time changes in labor costs in these companies, the relation between wage-rate and price changes can be examined directly in a way which, in other circumstances, would have only limited value.

¹³ It is not possible to make as accurate comparisons for this plant as for plant 1 between changes in wage rates and in labor costs as no data were available on piece-rate costs. Hence it is necessary to relate changes in both piece and hourly rates to the trend of total labor costs.

This comparison may be made both in terms of the timing and the relative amount of the changes.

Company X.—In the case of the selected shoe manufactured in plant 1 of company X, price decreases preceded wage cuts during the period 1931–32 and price increases were made in the years 1933–39 before wages were lifted. The same general statement applies to plant 2. This would suggest that price changes were made as required or permitted by market conditions, and wage rates then adjusted accordingly. The relation between labor policy and price policy is not, however, so clear-cut. It involves, first of all, an understanding of the relations between total costs and prices.

Total factory costs and factory selling prices have moved in rough correspondence in both plants of company X. The changes in costs and prices have nearly always been in the same direction, although the percentage changes shown in tables 2 and 3 differ to some extent in magnitude. Of course a given dollar change will in most cases represent a larger percentage change in costs than in prices. On the other hand, the figures shown are on a 1932 base, when profit margins generally were low if not nonexistent, and hence larger dollar increases in prices than in costs might reasonably be expected in the succeeding years.

TABLE 5.—*Timing of wage-rate and price changes, plant 1 of company X, selected shoe*

Date of wage-rate change	Amount	Date of price change	Amount
Nov. 16, 1931	Decrease of 4-8 percent.	Aug. 1, 1931	Decrease of 6.5 percent.
May 2, 1932	Decrease of 10 percent in day rates.	Feb. 1932	Decrease of 20 percent.
		May 31, 1932	Decrease of 20 percent. ¹
		June 21, 1933	Increase of 2.5 percent.
Aug. 14, 1933	Increase of 10 percent in piece rates and 20 percent in day rates.	July 20, 1933	Increase of 1.2 percent.
		Oct. 2, 1933	Increase of 4.8 percent.
Feb. 12, 1934	Increase of 10 percent in piece rates.	Nov. 7, 1933	Increase of 3.5 percent.
		Nov. 1, 1934	Decrease of 5.6 percent.
Feb. 15, 1937	Increase of 5 percent in piece rate.	Nov. 4, 1935	Increase of 5.9 percent.
		Jan. 15, 1937	Increase of 2.2 percent.
Aug. 16, 1937	Increase of 4.75 percent in piece rates and 5 percent in day rates.	May 3, 1937	Increase of 10.9 percent.
Nov. 8, 1937	Decrease of 4.75 percent in piece rates and 5 percent in day rates.		
		Mar. 22, 1938	Decrease of 2 percent.

¹ In piece rates.

Several conditions peculiar to the shoe industry make for a closer relation between costs and prices than is characteristic of many other industries, as already indicated. The industry leases its machinery from the United Shoe Machinery Co., making payments which vary approximately with changes in the volume of shoe production. In most other industries machinery costs take the form of relatively fixed depreciation charges, often of considerable magnitude. As a result, fixed costs per unit of output rise in these industries when output and sales decline, sometimes even in excess of the concurrent decline in variable costs and at the very time when demand and com-

petitive conditions call for price reductions; on the other hand, these costs fall when output and sales are expanding and demand and competitive conditions make price increases possible. The magnitude of these changes in fixed costs frequently results in a wide divergence between costs and price movements in periods of substantial fluctuations in value.

TABLE 6.—*Timing of wage-rate and price changes, plant 2 of company X, selected shoe*

Date of wage-rate change	Amount	Date of price change	Amount
July 6, 1931	Decrease of 10 percent.		
May 20, 1932	Decrease of 12.5 percent.	Aug. 1, 1931 Feb. 15, 1932	Decrease of 3 percent. Decrease of 3.1 percent.
Aug. 14, 1933	Increase of 15 percent in piece rates and 2.5 percent in hourly rates.	June 21, 1933 July 20, 1933	Increase of 3.2 percent. Increase of 3.1 percent.
June 1, 1935	Increase of 5 percent in piece rates.	Oct. 2, 1933 Nov. 7, 1933 June 1, 1934	Increase of 7.5 percent. Increase of 4.2 percent. Increase of 4 percent.
Jan. 22, 1937	Increase of 5 percent in piece rates and hourly rates.	Nov. 4, 1935 May 1, 1936 Jan. 15, 1937	Increase of 6.4 percent. Increase of 2.4 percent. Increase of 2.35 percent.
Mar. 15, 1937	Increase of 2.5 percent in piece rates and hourly rates.		
July 11, 1938 ¹	Decrease of 10 percent.	Mar. 22, 1938	Decrease of 3.3 percent.

¹ Effective only if production remained above 200 pairs a day.

TABLE 7.—*Costs and prices of selected shoe, plant 1 of company X*

[1932 average per pair=100]

	Labor	Materials	Manufacturing constant (overhead)	Total factory cost	Factory wholesale price	Sales in pairs
1931:						
Spring.....	118.0	113.0	111.6	124.7	118.0	152.7
Fall.....	115.6	127.1	101.4	118.9	118.0	100.0
1932:						
Spring.....	¹ 100.0	¹ 100.0	¹ 100.0	¹ 100.0	¹ 100.0	111.7
Fall.....						88.3
1933:						
Spring.....	(²)	(²)	(²)	(²)	(²)	70.2
Fall.....	87.3	93.1	98.7	92.7	95.5	88.0
1934:						
Spring.....	(²)	(²)	(²)	(²)	(²)	66.8
Fall.....	108.8	109.7	97.3	107.0	101.1	57.6
1935:						
Spring.....	112.5	98.0	97.3	101.7	95.5	(²)
Fall.....	105.7	101.0	93.9	100.8	95.5	(²)
1936:						
Spring.....	107.1	108.9	92.0	105.1	101.1	72.0
Fall.....	110.1	112.0	89.0	106.9	101.1	84.6
1937:						
Spring.....	111.6	114.2	92.8	109.2	101.1	89.3
Fall.....	116.0	128.6	100.2	119.6	114.6	64.1
1938:						
Spring.....	114.2	115.6	103.6	112.8	112.4	64.1
Fall.....	119.2	107.4	108.2	110.7	112.4	60.9

¹ Only the average for the entire year 1932 is shown, as the figures for each season reflect a change in the construction of the shoe. As a result of this change all the figures beginning with spring, 1933, are for a shoe which cost somewhat less to construct than the shoe made prior to 1932 would have cost.

² Cost data not available.

TABLE 8.—Costs and prices of selected shoe, plant 2 of company X

[1932 average per pair=100]

	Labor	Materials	Manufacturing constant (over-head)	Total factory cost	Factory wholesale price	Sales in pairs
1931: Fall.....	112.7	121.3	102.3	115.3	104.7	97.1
1932:						
Spring.....	100.0	100.0	100.0	100.0	100.0	106.6
Fall.....						93.4
1933:						
Spring.....	91.3	90.4	99.9	92.4	98.4	133.4
Fall.....	91.2	107.4	101.1	102.2	109.4	118.5
1934:						
Spring.....	(2)	(2)	(2)	(2)	(2)	140.2
Fall.....	108.8	123.9	99.7	115.4	121.9	122.0
1935:						
Spring.....	105.3	113.4	99.7	108.6	121.9	146.6
Fall.....	111.2	118.8	96.7	112.5	121.9	148.2
1936:						
Spring.....	112.2	127.7	97.3	117.8	129.7	165.2
Fall.....	111.8	128.8	97.3	118.3	132.8	150.8
1937:						
Spring.....	112.5	131.2	100.1	120.4	132.8	188.6
Fall.....	120.5	155.2	101.1	135.9	143.8	150.6
1938:						
Spring.....	121.8	132.0	107.3	124.5	140.6	150.6
Fall.....	123.3	120.4	110.7	116.5	135.9	165.6

¹ Only the average for the entire year 1932 is shown, as the figures for each season reflect a change in the construction of the shoe. As a result of this change all the figures beginning with spring, 1933, are for a shoe which cost somewhat less to construct than the shoe made prior to 1932 would have cost.

² Cost data not available.

In the shoe industry, however, about 80 percent of machine costs vary directly with volume of output, and do not increase per unit when volume declines.

Furthermore, the price of leather, which makes up about 60 percent of total factory costs, is highly flexible and is influenced by the demands of the large shoe companies. This flexibility in the price of raw materials together with the method used to pay for machinery make possible a relatively close adjustment of costs and prices, as illustrated by the data for both plants of company X.

Although costs and prices have changed similarly, the company has not been able to secure a stable budgeted profit per pair over the 1931-39 period. The range has been from a profit of 65 cents per pair to a loss of one cent. It is remarkable, however, that the greatest loss per pair for any season in a period which included the depression years of 1931-33 should be so small.

Whether this ability to secure a profit per pair almost throughout the depression was due to policy decisions which typically involved an adjustment of costs to the prices indicated by competitive conditions, or the setting of prices on the basis of cost estimates, cannot be determined from the data available. Probably every decision on price represented a compromise, with the market more important in some circumstances, and costs in other. The importance of the market is supported by the fact that wage changes have usually followed price changes, yet company officials emphasize the importance of costs in price policy. Cost budgets for the coming season are the most definite information available to the company, and the obvious starting point for deciding upon prices. Officials apparently begin by considering costs, but modify prices as may be required by

competitive conditions, and then attempt to bring costs into line with the modified prices.

There is evidence for example that their ability to avoid losses almost throughout the depression years was due not so much to a fixing of price on the basis of budgeted cost, as to the virtual 'absence of any fixed charges in the ordinary sense and to an ability to influence raw material and labor costs in line with the price cuts required by market conditions. Costs of leather, in particular, have shown susceptibility to pressure. Wages are not considered by the company as the easiest costs to cut in time of stress, although during the 1931-32 period the company found it necessary to cut wage rates in plant 1 shortly after both price cuts.¹³ Overhead costs are difficult to cut drastically enough to make any appreciable difference in costs per pair of shoes, principally because a large part of the office and supervisory staff is necessary even if production is falling, and the plant must be kept in good working order. However, because of the method of handling machinery costs, fixed overhead costs are not large and do not have an appreciable effect in raising unit costs when production is declining.

Similarly, it is the opinion of officials that there is not much opportunity to reduce costs by more efficient utilization of labor, equipment, or materials. The extreme pressure which the depression put on costs did not result in any significant acceleration of the rate of introducing improvements along the lines of new technology or reorganization of processes.¹⁴

But at such periods manufacturers can materially influence prices of leather and other supplies, and according to company officials they take considerable advantage of this position. The great importance of material costs is, of course, an incentive to put pressure on those prices.

Thus, on the basis of available information on price policy in depression periods, it appears that prices are fixed largely in the light of market and competitive conditions, and costs are cut to that level with a margin of profit wherever possible. In such periods, costs, including labor costs, play a strictly subordinate role in price policy.

During periods of business recovery, however, the situation is in one sense reversed. According to company officials, although generally favorable demand conditions must exist before prices can be raised, the impetus to raise prices comes from increases in costs, particularly material costs. The leather market is more distinctly a seller's market on the upswing of the business cycle. Under these conditions the company has greater control over prices of shoes than of its leather and other materials. Thus costs replace market conditions in the leading role in price policy. Again, wage changes play a secondary part, taking place after increases have been made in shoe prices, and usually being granted when increasing material prices have made increases in shoe prices necessary. Thus company officials say that when selling prices are rising generally in the industry, the atmosphere for the granting of a wage increase will be favorable.

In the recovery period from late 1935 to the first half of 1937, prices were raised three times for a total increase of over 11 percent on the shoe selected for cost analysis in plant 2 of company X before wage

¹³ See table 2.

¹⁴ This question is discussed in more detail in the next section.

rates were increased. The next price change after the two wage rate increases early in 1937 was a cut of 3.3 percent in March 1938.¹⁵

As may be seen in tables 5 and 6 changes in labor costs reflecting wage-rate changes took place in company X both during recovery and depression at times when materials costs were changing sharply, and the changes were in the same direction. No attempt was made to offset rising materials costs by wage cuts.

On the whole, it appears that changes in wage rates play a relatively minor role in price determination. Insofar as costs control price policy, this might be expected in view of the greater importance and flexibility of materials costs. Labor costs average about 25 to 30 percent of total factory costs per pair. Since wage-rate changes were reflected closely in labor costs, a 10 percent increase in wage rates would usually represent about a 10 percent increase in labor costs and a 2 to 3 percent increase in total costs.

In summary, the figures provided by the company together with the statements made by company officials suggest that company X changes its shoe prices without close reference to wage-rate changes, either as to timing or general magnitude. In periods of prosperity prospective wage changes may influence the magnitude of price changes a little more than in periods of depression. It should not be inferred, however, that changes in labor costs resulting from wage-rate changes were unimportant factors in the profit earned per pair. Given the shoe prices and materials costs prevailing at the time wage changes are made, they do, of course, appreciably affect the margin of profit per pair.

Company Y.—For company Y somewhat less extensive data on costs are available for the shoe selected for analysis. In the preceding section attention was called to the fact that the position of company Y as a price leader permitted it to raise wages sooner and cut them later than most of its competitors. It has without doubt been able to keep its prices and costs in line with unusual precision, more closely, in fact than company X over the same period. This adjustment was accomplished in a fashion quite similar to that adopted by company X, except that the position of industry leadership held by company Y gave it more freedom from competitive pressure on its prices than company X enjoyed, though it of course had to take some account of the prices set by its competitors.¹⁶

In times of depression, the primary emphasis is on adjusting costs, including labor costs, to the price required by the market and competitive situation; in good times it is more customary for prices to be raised when rising materials prices require it, usually by enough to permit a concurrent wage increase without reduced profits. Although company Y evidently exercises considerable control over its prices, nevertheless the close adjustment which it has made between its costs and prices may perhaps be attributed as much to its control over important elements in its cost as to its control over prices. The role of wage policy in price policy is largely secondary to changes in materials costs and in the market situation.

¹⁵ See table 6.

¹⁶ The influential position of company Y was corroborated by other concerns in the industry. Officials of one company manufacturing more expensive men's shoes, stated for instance, that changes in company Y's prices will affect the policies of other concerns not really competitive. If company Y's prices are raised, other manufacturers are impressed with the fact that costs generally must have risen and are inclined to raise their own prices. Similarly a price cut by company Y will suggest to the other firms that costs must have fallen, and that, in order to remain competitive, their prices must be cut, too.

TABLE 9.—*Costs and prices of selected shoe, company Y*

[1936 average per pair = 100]

	Produc- tive labor	Materials	Miscel- laneous factory costs ¹	Royalty and rentals ²	Total factory costs	Factory selling price	Produc- tion in pairs
1936:							
Spring.....	100.8	102.0	100.0	100.0	101.4	101.4	99.9
Fall.....	99.2	98.0	100.0	100.0	98.6	98.6	100.1
1937:							
Spring.....	101.5	99.1	107.6	100.0	100.2	100.5	114.5
Fall.....	106.7	113.7	107.6	100.0	111.2	107.3	100.2
1938:							
Spring.....	106.0	100.7	111.8	100.0	102.6	101.4	96.9
Fall.....	96.3	87.3	111.8	100.0	91.5	92.7	104.2

¹ These include items other than those usually included in overhead costs, but do not include the royalties and rentals paid for machinery.

² Royalties and rentals paid for the use of machinery.

The relation of wage policy to price policy during a period of declining demand is illustrated by the sequence of events during 1938. Between the fall of 1937 and the spring of 1938, factory costs had declined 7.7 percent largely as a result of an 11.4-percent reduction in unit materials costs. Prices had also been cut by 2.1 percent on December 1, 1937, and again by 7.5 percent on January 1, 1938, an aggregate reduction of 9.4 percent. However, the drop in total costs between the fall of 1937 and the spring of 1938 was greater than the drop in the factory price in effect at the beginning of each season, so that actual average profit per pair increased 9.7 percent.

The two price cuts during the winter of 1937-38 had been inadequate to maintain volume, which was 15 percent lower in the spring season of 1938 than it had been in the spring of 1937. Consequently, the desirability of a further reduction was considered. Officials believed on the basis of past experience and a "hunch" that a price cut of 8.5 percent would increase sales and production by about 10 percent. This would retrieve most of the loss in volume since the spring of 1937 and, according to the president of the company "do something to restore (workers') earnings or at least prevent them from falling further."

Officials of the company could not be certain that a price reduction of this amount would be warranted by the decline in materials costs alone. Consequently wage earners and salaried workers and executives alike were asked to accept a cut of 8.57 percent on the ground that this would help the company to cut its prices and thereby increase volume. In making a wage cut at this time (July 1938), the company followed its policy of being "among the last to decrease wages," since reductions of 10 to 15 percent had been general in the industry during the preceding 8 months.

Accordingly, both wages and prices were reduced by about 8.6 percent in July 1938. Subsequently, materials costs continued to drop, falling 13.3 percent between the spring and fall of 1938, while labor costs fell 9.2 percent. As a result of a 7.9-percent increase in volume, average semiannual earnings for workers rose slightly, from \$648 for the first half of 1938 to \$656 in the last half, but still remained substantially below their level of the second half of 1937, when earnings had been \$723.50. In the first 6 months of 1939, however, individual earnings averaged \$681. As it developed, the actual decline

in raw materials costs alone exceeded the amount of the price decrease, with the result that the accompanying wage decrease helped to make possible a 41.8 percent rise in the actual average profit per pair between the first and second half of 1938.

Despite the fact that costs are the starting point for price changes, this instance illustrates the important role in price policy played by actual and anticipated changes in demand and market conditions during periods when business is declining, and the tendency to adjust costs to prices, rather than prices to costs.

In times of rising demand, costs resume a more important role in price policy and prices are raised when increased materials costs require it. Because of its position as a price leader, company Y to an even greater degree than company X puts wage rate increases in a position subordinate to materials costs and to price advances. It is usually only when higher leather prices require an increase in shoe prices and the general competitive situation is such as to permit such increases, that wage increases are regarded as feasible. The company's desire to be among the first to increase wages and the last to reduce them also plays a part in the timing of wage changes.

As in the case of company X, wage changes are of importance to profits per pair, particularly in depression periods when prices are more greatly influenced by market conditions, but they have been less important than materials costs.

TECHNOLOGICAL CHANGES

There have been continual changes in the methods of producing shoes and in the style and construction of the shoes themselves since the introduction of the first sewing machine almost a hundred years ago. A few of these changes have been spectacular, like the McKay sewing machines, but many more have had smaller and more gradual effects on the productivity of labor and on costs of manufacture. Over a period of years, the new effect of these changes has been substantial. A recent engineering analysis,¹⁷ for instance, showed that the man-hours of labor required for the normal daily production of 2,000 pairs of men's shoes had decreased from 31,020 in 1850 to 3,402 in 1900 (assuming 10-hour days), to 2,124 in 1923, and to 1,870 in 1936 (assuming 8½- and 8¼-hour days, respectively).

The distinction between changes in technology that originate within a company and those that are passed on to it by other firms supplying raw materials, parts, and equipment is of particular importance in the shoe industry because of the dominant position of a single manufacturer of shoe machinery—the United Shoe Machinery Co. The position of this company is such that practically all changes in the machinery used to make men's shoes are controlled by it. For technological changes of this sort every shoe company is dependent upon the United Shoe Machinery Co., which has always followed the policy of leasing or renting its machinery. In most cases a shoe manufacturer is charged a royalty for leased machines in direct proportion to the volume of production, measured by the number of pairs of shoes processed or stitches sewed. In a minority of cases, when no satisfactory unit of measurement of operations is available, machines

¹⁷ "Labor Productivity in the Boot and Shoe Industry," Monthly Labor Review, February 1939, pp. 271-292.

are rented at a given figure per month. Rental charges ranged from 19 to 26 percent of the combined royalty and rental costs of company X in the period 1930-38.

The United Shoe Machinery Co. maintains a large staff of agents who service and repair the shoe machinery. According to an official of company X, an agent of the United Shoe Machinery Co. visits the factory for one reason or another almost every day. When a new machine is introduced, these agents inform superintendents and foremen in the plants they visit. The new machine may first be tried out under actual factory conditions in some chosen plant at the expense of the United Shoe Machinery Co. The experience, if favorable, then provides an excellent sales argument in approaching other shoe manufacturers.

Although companies X and Y and other individual shoe manufacturers have an almost negligible influence on the development of new machinery, they do influence the rate at which these technological changes are adopted. On the basis of studies made by the research department of the United Shoe Machinery Co. of the probable savings to be achieved by the renting of a new machine, and of their own rather careful cost estimates, the officials of companies X and Y decide when a new machine is to be introduced.¹⁸ Actual responsibility for company X's decisions on technological changes rests with the president and the plant superintendents, although formal approval is also given by the board of directors. If an expenditure of more than \$100 is involved, the president consults the controller.

Other considerations than immediate dollar savings frequently enter into the decision to install a new machine. Its effect on the quality of the product may be of central importance. For instance, the introduction of the automatic tip burnishing, skiving, and perforating machine in June 1933 not only reduced costs but, according to company X, also materially improved the quality of workmanship. In the case of the lacing machine, introduced by company X in December 1938, there were no savings in costs; in fact, royalty charges for this operation were doubled, to \$0.0015 per pair. The slight extra expense was justified by the company on the ground that "the new machine more than makes up in superior workmanship the added charge." Opposite eyelets on the stitched uppers are now laced separately and more uniformly, resulting in better pull-over lasting operations.

Negotiations with employees sometimes play a role in the decision to introduce a new machine, and in the rate at which it is introduced, particularly if the machine is likely to displace considerable labor. The heel seat laster, installed by company X in plant 2 in July 1936, involved a substantial displacement of labor. Company X agreed informally with the employees' association in this plant that it would increase the work on the new machines only as bed lasters left the company's employment, or as production increased. By following this procedure in introducing the machine no operators were laid off, although no new employees were hired to replace those who left the company. During the years 1936-38, the machine was run on a very limited scale, somewhat on an experimental basis, with employees

¹⁸ In both companies savings are normally calculated by multiplying savings in labor costs less increased royalty costs per dozen pairs of shoes by the estimated annual production. This estimate of production is secured in various ways.

paid by the day. In June 1936, on the basis of the production experience with the machine, piece rates were set and piece-rate workers assigned to the machine. In September 1939, after the machine had been installed more than 3 years, only about half of the plant production was handled on this machine; the other half was still being handled on the less economical bed lasting machine. The company anticipates eventually using the new machines for the total volume of production, but only in line with the agreement with its employees.

In spite of a potential saving in labor cost of three-fourths of a cent a pair after deducting increased royalty charges on the new machine, it has not been introduced in plant 1 of company X for a variety of reasons. The old machine permits a higher quality of workmanship on the high-grade shoes produced in this plant. Furthermore, to install the newer machine would mean a rather extensive reorganization of departmental layout, which has not yet seemed justified to the company by the savings that can be expected from the new machine. Officials also believe that the attempt to introduce the machine, with consequent departmental reorganization, would be difficult to do under a union situation.¹⁹

The automatic heel-seat-lasting machine was introduced by company Y under quite similar conditions. The company also decided that "no operators should be laid off to make way for these machines * * * all surplus operators would be placed on other work * * * which would permit (them) to earn wages comparable to what they earned on the bed machine." Twelve automatic machines were installed, replacing 27 of the old bed lasting machines. Twenty-eight operators had to be placed on other jobs. Two left work voluntarily—one because of illness, the other because of a change in residence. Two others were eventually discharged, after proving unsatisfactory on other jobs, and the remaining operators were transferred to other jobs, frequently requiring extensive retraining. In transferring these workers the company agreed to guarantee that their earnings for 4 weeks during the training period would be within \$5 or \$10 per week of their previous normal weekly earnings. The total cost of these guaranties to the company was approximately \$700, or an average of \$27 per operator.²⁰

Eleven months were required to complete the installation of the new machines and the reassignment of the displaced wage earners in one plant of company Y. In this period, the company estimated its net savings, after allowance for increased royalties and guaranties to displaced workers, to be slightly over \$10,000, or about eight-tenths of a cent per pair on men's shoes and six-tenths of a cent per pair on boys' shoes. If all operators had been laid off and all automatic machines installed at the outset, the estimated net saving would have been more than twice as much, or about \$21,000.

Technological change may take other forms than the leasing or renting of new machines from the United Shoe Machinery Co.

¹⁹ Neither of the 2 large unions in the shoe industry has adopted any official resolutions or statements indicating opposition to the introduction of new machinery or methods of production.

²⁰ Transfers were facilitated by the fact that during the period of installation of these automatic machines there were 45 male separations from the company, 23 discharges, 19 voluntary quits, and 3 deaths. Not all these vacancies could be filled with former bed-heel operators because of differences in earnings and in the type of work performed. More than 1 shift was frequently made to find a place for these displaced employees. The 24 bed-heel operators were transferred to 14 different jobs. Seven were shifted directly to the automatic heel-lasting machines, while the remaining 4 machines were manned by workers transferred from tack pulling and cementing linings. Other transfers of displaced bed-heel lasters were to the following operations: Assembling 1, side lasting 2, side lasting, tack pulling, and automatic heel lasting 1, toe lasting 3, pulling tacks 1, trim in seams 1, beat welts 1, lay soles 2, loose nails 1, level 1, trim edges 1, and set edges 1.

Changes have been made by these two companies in the design, style, and construction of shoes, in the arrangement of the plant, and in non-leased equipment. Before these changes are made, probable costs are calculated and compared with estimated savings in labor costs. The gains which may be realized by a smoother flow of work through the factory, improved quality of product, etc., are also given consideration. For instance, "mullers" were installed by company X to humidify the leather and make it more pliable for lasting and other operations. Internal transportation has been improved by conveyors, new forms of elevators, etc. A shoe-rack conveyor purchased in 1931 by company X at a cost of \$1,700 made possible continuous lowering of shoe racks from upper to lower floors. Part-time work formerly performed by an elevator man was thus eliminated, with a consequent saving in labor costs.

Since neither company has a formal research department, changes of this type are introduced as a result of studies and cost estimates made by production officials and other executives when they can find time from more routine duties. The controller of company X, for instance, said that he had several studies under way which would improve office efficiency. However, he had not had sufficient time to work on these studies during the previous 6 months.

Illustrations given in preceding paragraphs of this section of typical technological changes indicate that in company X most changes have had very small effects on costs. In the period 1930-38 no single change on the standardized men's shoes selected for special study affected labor costs more than 1 cent per pair, equivalent to less than one-half of one percent of total factory costs per pair.

It also appears probable that increases in wage rates in recent years have played no decisive part in the decisions to make technological changes of any of the types discussed above. Increased wage rates would, of course, increase the savings in labor costs that would be expected from the introduction of a new machine, but a study of the changes made in the period 1930-38 indicates that the effects of the new machine or process on the quality of the product, the attitude of wage earners, and the cost and inconvenience of the change itself are more important factors. The dates of introducing technological changes seem to be very much more conditioned by the date of release of machinery by the United Shoe Machinery Co., the work schedules of officials of the company, and the volume of production than by any particular wage-rate increase.

CHAPTER II

THE PAPER INDUSTRY

Two paper companies cooperated in this inquiry by making available their cost records for the years 1936-38, and by discussing their wage, price, and technological-change policies.

During the 1936-38 period, wage-rate changes were made by these two paper companies after careful consideration of their profit and cash position. In the case of company A, the action of other paper companies and of industry generally was also watched by those responsible for wage policy, and in company B decisions on wage changes were influenced by negotiations with the union to which its employees belong.

Changes in wage rates have affected the hourly earnings of company A's employees about proportionately, although changes in the volume of employment and in the proportion of women workers have also had some effect on the average for the plant. No data on hourly earnings in company B were available. Changes in wage rates have been followed by proportionate changes in labor costs per unit in company A although here again fluctuations in the volume of output have been a factor. In company B both the volume of output and labor-saving technological improvements have affected labor costs, and there has been no close relationship between wage-rate changes and movements in the company's labor costs per unit. By the end of 1938 direct labor costs per unit were only a little over 5 percent above the early 1936 level, although wage rates had been increased nearly 20 percent.

Labor costs are not as important as raw-material costs and fixed expenses in the total costs per unit of either company, nor do they fluctuate as widely. Costs and realizations have been closely related during this period, largely because of the flexibility of raw-material costs, rather than any attempt to fix prices on the basis of costs. Prices are to a large extent market-determined and not subject to administrative control by the company's management. These circumstances have combined to minimize the importance of labor costs in the prices at which paper is sold. Wage policy is almost unrelated to price policy, although it is important to the profits and to the general financial position of both companies.

Technological changes are made more or less as a matter of routine to reduce costs and to improve quality. Reduction in overhead costs has been a more important consideration in recent years than prospective savings in labor costs. The level of wage rates is not considered by officials to be of any importance in deciding on technological improvements.

INTRODUCTION

According to the Census of Manufactures there were, in 1937, 841 establishments engaged in the production of paper and pulp, employing 137,803 wage earners and paying approximately \$175,000,000 in

wages. The total value of product for this industry was in excess of \$1,200,000,000, and value added by manufacture was \$484,000,000. The paper industry proper, with which this study is primarily concerned, comprised 647 establishments having 110,000 wage earners and a total wage bill of \$142,000,000. Value of product was \$958,000,000 and value added \$390,000,000.¹

Two companies were requested to cooperate in this survey, and data were secured for one of the plants operated by each company for the period 1936-38, inclusive. Company A is a large producer of paper, with plants located at various points in the eastern part of the United States. It is engaged in the manufacture and sale of four chief types of product: (a) wood pulp, almost all of which is absorbed by its own paper mills; (b) book and other white papers; (c) other paper products; and (d) commercial byproducts of the pulp-making processes.

The present study is concerned only with the company's largest mill, which in recent years has accounted for approximately half of the total net sales of the company as a whole. The principal products of this mill are publication grades of book paper. Production of these grades comprised from 60 to 75 percent of the total tonnage for the plant during the period studied.² They are sold either direct to publishers or through a sales agency on a flat commission basis. Other products of this mill include the lower grades of bond and envelope papers and certain similar specialties.

The mill has a full line of equipment. There are nine paper machines, as well as coating machines, supercalenders, rewinders, etc. There is a soda pulp plant which produces about 30 percent of the requirements of the paper machines, using softwoods, most of which are grown in the vicinity by farmers and others. There is also a de-inking plant for the production of pulp from old magazines, etc. The balance of the pulp requirements is purchased in the open market.

The mill is well located from the point of view of access to raw materials. Although it is at a slight disadvantage in comparison with some of its competitors with respect to that portion of its pulp which it must purchase on the open market, this disadvantage is probably offset when the other sources of its pulp are taken into account. Fuel costs are likewise low. The company as a whole has an excellent reputation in the industry for progressiveness and efficiency.

While the present survey was confined to the operations of the one plant as a unit, its position as part of a large organization must be kept in mind, since certain corporate policies are determined by the needs of the company as a whole and affect all of its plants.

Company B, located in the eastern part of the country, is a much smaller concern than company A and is also smaller than its more important competitors. Four paper machines are housed in three mills which are near to one another. The company has no equipment for the production of wood pulp, but de-inked book stock is made from old magazines and used in the production of certain grades of paper.

¹ U. S. Department of Commerce, Bureau of Census, Biennial Census of Manufactures, 1937, pt. I, pp. 556 and 563.

² The fluctuation in the percentages was mainly due to variations in the output of other grades. The volume of production of the publication grades was fairly steady throughout the period.

In technical equipment and operating efficiency the company has been at something of a disadvantage. Most of its machinery was installed many years ago, and the funds necessary for maintaining and improving their efficiency were not available during the depression. Since 1934, however, the equipment has been substantially modernized.³ The company's raw-material costs are probably close to the average of those of its competitors. Freight costs to the major eastern markets are low.

The production and sales policy of the company has been radically altered in recent years. Prior to 1930, large contract orders formed a major portion of total sales. Most of these contracts were lost or given up during the depression years when prices were falling rapidly. In recent years, smaller specialty orders have been substituted for these earlier contracts. This policy required heavy expenditures for research and experimentation, but it has resulted in greater diversification and less price competition. The larger companies are less likely to underbid on small and specialized orders. The consumer, moreover, is less likely to shift in order to make a small saving in price, since the papers have been designed to meet his particular specifications.

WAGE POLICIES

The wage policies of both companies studied are influenced greatly by their individual financial positions, although other factors such as wage trends in industry in general and in the paper industry in particular have provided broad guides to wage policy, particularly in the case of company A. Collective bargaining has played a role in the wage policy of company B but not in that of company A, which was not organized during the period covered by the study.

Company A.—The wage structure of the company A plant surveyed was established about 1920 as the result of a job-evaluation study. The wage differentials set at that time have been changed somewhat in recent years, though no single outside influence has been of great importance in determining the present differentials. The going rate in the community is considered in establishing the base labor rates, and the rates paid by both nearby and distant competitors are used in establishing rates for the skilled and semiskilled paper-making jobs. Since the abandonment of a bonus system in December 1936, substantially all employees have been paid on a straight hourly basis.

During the period covered in this study, the employees of company A's mill were unorganized. Some years ago the Brotherhood of Papermakers organized a large proportion of the workers, but negotiations for an agreement broke down and have not since been resumed. In recent years there has been no collective bargaining machinery, and changes in wages, hours, and working conditions have been made without consultation with the workers.

Final decisions with respect to general wage changes rest with the executive committee composed of the president and two vice presidents. According to company officials, wage changes are usually not discussed until the need for them has become apparent to all the executives. Consequently, discussion is usually confined to the extent,

³ For a discussion of certain aspects of this process of modernization, see below p. 41.

form, and timing of the change. The policy of the company is to make similar wage changes in all its mills simultaneously.

During the years 1936-38 three general wage changes were put into effect. On December 13, 1936, a basic increase of 10 percent was granted, accompanied by additional increases of 1 to 5 percent on individual jobs to compensate for the loss of bonus accompanying the concurrent discontinuance of an incentive system. While it is impossible to determine the precise extent of the average change in wage rates, it was probably substantially less than 10 percent when full allowance is made for the elimination of the bonus. Wages were further increased by 5 percent on August 8, 1937, and then decreased by 7 percent on September 4, 1938.

According to officials of the company, these wage changes were made after consideration of the course of wage changes in other firms, both inside and outside the paper industry, and of the financial condition of the company. Trends in wages paid by other paper producers and by industry generally are watched closely by those responsible for wage policy. Naturally, the actions of paper producers located near the company's principal plant, which is the one here described, exert the most immediate effect. The company exchanges information regarding general wage rates with a number of its competitors, but even in the absence of such a formal arrangement wage changes made by any of its important competitors quickly become known. While it is not the policy of the company to lead in making wage changes, it avoids being the last to follow.

Although the decision to make a change is guided by conditions in industry generally and among other paper firms in particular, the amount and exact timing of wage changes are largely determined by the financial position of the company itself.⁴ Wage increases are usually made after relatively long periods of increasing volume and profits. When volume is sustained at a level high enough to insure good profits, wage rates are likely to be raised, and when lower volume has reduced profits or resulted in losses, wage cuts become likely, although the pressure to reduce rates may not be great until the cash balance of the company becomes low. It is conceivable that these guides might on some occasion point in different directions. In actual practice, such conflicts have apparently been rare, primarily because all important mills in the country, even those making somewhat different grades of paper, are affected to a great degree by the same external conditions.

However, when most of the industry is reducing wages, officials of this company feel it important to take similar action even though its profit position may not seem to officials to require a wage reduction. This policy is based upon the belief that failure to reduce wages during a downturn would not avert pressure to increase wages during the ensuing upswing. The same reason is given for the policy of changing wages simultaneously in all of the company's mills regardless of the conditions prevailing in any one mill.

Table 10, listing the wage changes made by company A and three leading competitors from 1932-39, reveals the broad similarity in direction and magnitude without any consistent pattern of closely grouped changes which the foregoing statement of the basis of wage

⁴ It is only natural that company-wide changes should be based on company-wide profits rather than the condition of individual plants.

policy might lead one to expect.⁵ On the whole, the wage changes made by company A have been fewer and smaller in extent than those of its competitors. According to company officials, this is largely due to their large contracts which have given them a more uniform volume of business and steadier employment than most of their competitors.

TABLE 10.—*Timing and approximate amount of wage changes, 1932-39,¹ selected companies in the paper industry*

	Company A	Competitor X	Competitor Y	Competitor Z
	Percent	Percent	Percent	Percent
June 1, 1932		-10		
June 5, 1932			-10	
July 1, 1932				-3 to -6
Aug. 1, 1932	-10			
Jan. 22, 1933			-10	
Apr. 2, 1933		-10		
July 1, 1933		+11.1		
July 24, 1933	+11			
July, 1933				+10
July 30, 1933			+11	
Aug. 1, 1933				+15
Aug. 7, 1933		+12.5		
Oct. 15, 1933			+12	
May 15, 1934		+5		
July 9, 1934	+4			
Oct. 1, 1934				+2.5
Nov. 1, 1934			+5	
Dec. 1, 1936			+5	+10
Dec. 13, 1936	+10			
Jan. 3, 1937		+10		
Feb. 23, 1937			+5	
Apr. 15, 1937				+5
June 1, 1937			+10	
July 19, 1937		+5		
Aug. 8, 1937	+5			
Aug. 7, 1938		-10		
Sept. 4, 1938	-7		-5	
Nov. 1, 1938				-10
Jan. 1, 1939		+5		
Mar. 1, 1939				+5

¹ It should be understood that most of the figures shown in the above table are only approximate, since many readjustments in differentials were made at the time of most of the changes.

These statistics were compiled for a study of wage changes in the paper industry from 1929 to 1939 made by W. R. Maclaurin and J. A. Brownell and were not collected in the course of the present inquiry.

Company B.—In general, wage changes made by company B have been determined independently of the action of the other paper companies or of industry generally, according to company officials. The company has been largely guided by its own financial position and has paid little attention to the general trends of the industry. Table 11 shows the changes in wage rates made by company B and by four other paper firms located in the same general area in the period between 1930 and 1939. There is little uniformity apparent between these mills in the timing or extent of wage changes. This may be partly due to the fact that only one of the other mills produces paper which is strictly competitive with company B, although all have at least some similar operations and compete to some extent in the same labor market.

During the last few years, the employees of company B, as well as those of other mills in the area, have become organized in a union affiliated with the American Federation of Labor, and the union has thus become a factor in its wage policy. This union was not formally

⁵ None of the companies is a competitor with company A for labor.

recognized by company B until 1937, though many of its workers had been members for several years preceding that time. Since the advent of the union there has been a tendency for wage changes in firms in the vicinity to be more closely related. Fairly uniform minimum rates prevail but there remain material differences between mills with respect to rates paid for the more skilled operations. The persistence of these differences may be due to the fact that skilled workers have little opportunity to shift from one of these plants to another.

TABLE 11.—*Timing and approximate amount of wage changes 1930-39, selected companies in the paper industry*¹

	Company B	Mill M	Mill N	Mill O	Mill P
	Percent	Percent	Percent	Percent	Percent
Dec. 1, 1930.....			-10		
Feb. 25, 1931.....	-5				
Aug. 31, 1931.....			-5		
Oct. 4, 1931.....	-5				
May 16, 1932.....				-10	
Aug. 18, 1932.....			-10		
Sept. 12, 1932.....	-15				
Nov. 14, 1932.....				-15	
Dec. 2, 1932.....					-10
Jan. 1, 1933.....	-10				
Jan. 1933.....		-10			
Jan. 23, 1933.....			-25		
July 24, 1933.....	+10				
Aug. 1, 1933.....				+10	(²)
Aug. 16, 1933.....					+10
Aug. 28, 1933.....			+15	(²)	
Dec. 1, 1933.....				+10	
May 13, 1934.....	+10			+10	
May 14, 1934.....					+10
Nov. 7, 1934.....			+10		
Aug. 26, 1935.....			+10		
Jan. 19, 1936.....	+10				
June 7, 1936.....			+5		
Nov. 1936.....		+11			
Dec. 13, 1936.....			+10		
Jan. 4, 1937.....	+8				
Mar. 10, 1937.....					+10
Mar. 29, 1937.....				+7	
July 4, 1937.....	+10				
July 5, 1937.....		(³)			
July 20, 1937.....					+10
July 25, 1937.....			+8		
Sept. 13, 1937.....				+5	
Nov. 16, 1937.....					+10
Oct. 16, 1938.....			-7		

¹ It should be understood that most of the figures shown in the above table are only approximate since many readjustments in differentials were made at the time of most of the changes.

² Women only.

³ +10 percent day; +20 percent hour.

These statistics were compiled for a study of wage changes in the paper industry from 1929 to 1939 made by W. R. Maclaurin and J. A. Brownell, and were not collected in the course of the present inquiry.

Over the period 1936-38 there were three general increases in wages put into effect by company B. The volume of production had increased substantially during 1935 and this fact, coupled with the growing activity of the union, largely explains the 10-percent increase of January 1936. Production continued to rise and a second increase was made in January 1937, with many other mills increasing wages at approximately the same time. In July 1937, after 8 months of near-capacity production, the union was officially recognized and wages increased by another 10 percent. As in the case of company A, wage-increases are made when volume is large.

It is interesting to note that, although wage decreases were general throughout the paper industry in 1938, only one of the mills in this area followed the trend, and this was a mill which was controlled by a company having various plants in other parts of the country. There seems to have been a general reluctance on the part of each of these companies to take the lead in seeking a cut; it was probably believed that a reduction would cause more difficulties than the savings would warrant.

WAGE RATES AND AVERAGE HOURLY EARNINGS

The relation in company A between changes in wage rates and in average hourly earnings has been examined for the period 1936-38. (Figures for company B were not available.) Hourly earnings for company A are reported for 4-week accounting periods, with 13 such periods in each year.

In general, average hourly earnings of employees of company A varied in close relation to changes in the level of wage rates. Table 12 shows that each change in wage rates was followed by almost an exactly proportionate change in average hourly earnings in the succeeding accounting period.

TABLE 12.—*Employment and earnings, company A*

[1936-38 average=100]

Year and period number	Total number of employees	Ratio of women to total employees	Average hourly earnings	Year and period number	Total number of employees	Ratio of women to total employees	Average hourly earnings
<i>1936</i>				<i>1937</i>			
1.....	88	6.3	102.1	8 ²	116	7.2	107.1
2.....	94	7.2	101.0	9.....	116	7.6	112.0
3.....	102	8.5	98.4	10.....	116	8.3	111.8
4.....	107	8.9	98.2	11.....	116	7.9	112.2
5.....	109	8.7	98.4	12.....	115	8.0	113.3
6.....	101	6.5	99.6	13.....	113	8.2	114.1
7.....	96	4.9	101.4	<i>1938</i>			
8.....	95	4.5	101.7	1.....	111	7.8	113.8
9.....	95	4.7	101.2	2.....	111	7.6	114.1
10.....	100	4.7	101.4	3.....	111	7.6	114.1
11.....	105	5.8	99.8	4.....	110	7.4	115.0
12.....	110	6.0	88.5	5.....	109	7.2	115.2
13 ¹				6.....	107	6.6	114.7
<i>1937</i>				7.....	107	6.5	114.3
1.....	112	6.3	106.2	8.....	105	6.4	114.9
2.....	115	6.4	105.5	9 ³	104	6.5	114.9
3.....	116	6.7	106.0	10.....	104	6.5	106.9
4.....	117	7.4	105.5	11.....	106	7.3	106.5
5.....	117	7.4	106.2	12.....	107	7.4	106.3
6.....	116	7.5	106.5	13.....	132	7.3	106.5
7.....	116	7.9	107.1				

¹ Figures for the thirteenth period of 1936 were not available. Wage rates were increased 7-10 percent on Dec. 13, 1936.

² Wage rates were increased 5 percent on Aug. 8, 1937.

³ Wage rates were decreased 7 percent on Sept. 4, 1938.

Average hourly earnings are also affected somewhat by changes in the volume of employment, and to a lesser extent, by the ratio of women employees to total employees. This is illustrated in table 12. The largest fluctuations in average hourly earnings without a general change in wage rates were in the year 1936, when major variations in the volume of employment and in the proportion of women workers resulted in changes of as much as 4 percent. Earnings declined as

employment expanded and the ratio of women workers rose, and increased as these trends were reversed. This relation is partially explained by the policy of the company in starting new employees, or old employees transferred to new jobs, at the beginning rate for the particular job. These rates are increased automatically by 2 cents an hour every 3 months until the full rate for the job is reached. It requires 9 months for the lower paid jobs and as long as 18 months for more highly paid work to reach full-time rates.

A significant exception to this relation between earnings and employment is provided by the thirteenth period in 1938, when employment rose about one-fourth without any appreciable change in average hourly earnings. A complete explanation of this exception is not available but it is known that the increase in employment was attributable to the Fair Labor Standards Act. It may be that the additional employees required by the act, unlike those added when business expands, were of about the same average skill as those already on the job.

TABLE 13.—*Wage rates and labor costs per unit, company A*

[Average of first 12 periods of 1936=100]

Date	Amount of wage change (percent)	Operating labor costs	Repair labor costs	Total labor costs	Average production per period
1936 (first 12 periods) ¹		100.0	100.0	100.0	100.0
Dec. 13, 1936.....	+7 to +10				
1937 (first 8 periods).....		104.4	110.8	105.0	129.1
Aug. 8, 1937.....	+5				
1937 (last 5 periods).....		112.4	133.3	114.1	115.9
1938 (first 9 periods).....		109.8	123.5	110.9	102.7
Sept. 4, 1938.....	-7				
1938 (last 4 periods).....		106.2	129.4	108.2	102.2

¹ No data were available for the thirteenth period.

WAGE RATES, LABOR COSTS, TOTAL COSTS, AND PRICES

Although employees are primarily interested in wage-rate changes as they affect hourly earnings, to the employer their chief importance lies in their influence on labor costs, and through them on total costs and prices. As in the case of the other industries included in the present study, these questions can only be approached with an understanding of the accounting procedures used by each company.

Accounting Procedures.

The system of cost accounting used by company A has the reputation of being one of the best in the paper industry and it is unquestionably thorough and detailed. However, it is not designed in such a fashion as to provide ready answers to the questions toward which the present inquiry is primarily directed.

The chief objective of the accounting systems of both companies is departmental control. Both standard and actual costs are computed, but only standard costs are available for particular grades of paper. Comparisons of the sort made in this inquiry are wholly satisfactory only when they can be made for a single, reasonably homogeneous product such as a single grade of paper. In this instance, the standard costs for one grade of paper could not be used, however, as they are not broken down by functions such as labor, materials, overhead, etc.

Hence actual cost figures have had to be used, though they are only available for the entire output of the selected plant rather than for single grades of paper.

Both company A and company B compile their accounting records for 13 4-week periods in each year. The data presented below are either for these periods or for averages of a group of consecutive periods with similar characteristics.

Company A.—Actual aggregate costs for all grades are computed by 4-week accounting periods, and broken down into their most important components. These data are, of course, not entirely satisfactory for analysis of changing total costs in relation to wages and prices, the chief difficulties arising from the variation in the proportions of the various grades of paper in the total output. There is no way in which the effect on costs of this variation can be measured. For example, if labor costs per unit of output have risen, the rise may have been due to an increase in wages, to lowered efficiency, or to the production of a larger share of grades of paper requiring proportionately more man-hours of labor, or to a combination of all these factors. The difficulties of interpretation thus imposed are real and, for the present inquiry, insurmountable.

Another major problem arises from the fact that administrative, selling, and interest expenses are not allocated to individual mills. Only manufacturing costs are computed for each mill, all other expenses and all income merely being lumped together for the company as a whole. In order to get an indication of the actual net profit for the particular mill, it was necessary to make an ad hoc allocation of these expense items. Net administrative expense was allocated on the basis of tonnage sold by each mill. Commission expenses were distributed on an actual basis, other selling expenses in proportion to tonnage sold. Interest charges were allocated on the basis of the book value of plant and equipment in the various mills.

Total costs, as presented in the subsequent discussion, are thus a composite of actual manufacturing costs and a hypothetical allocation of administrative, selling, and interest expense made especially for this inquiry. The results are expressed in terms of costs per ton. Since the number of tons produced in a given period does not coincide with the number sold, the more appropriate of these two items has been chosen as the divisor in each case. All of the items included in manufacturing costs have been divided by the number of tons produced; the other items have been divided by the number of tons sold.

These total cost and net profit figures have all been calculated for the specific purposes of this inquiry. Since they were not computed in the course of the ordinary business practice of the company they could not have been used by executives as a guide to the determination of policies. They do, however, afford an indication of the changes in profitability of operations for the particular mill over the 3-year period.

One further point should be mentioned in connection with the accounting procedures of the company. Certain items, notably social-security taxes, which obviously bear a direct relation to expenditures for labor, are not included in the "labor" components of manufacturing costs. In the summaries of actual manufacturing costs which are regularly compiled for each 4-week period, these taxes are included under the general heading of "Depreciation, etc." A similar disposition is made of charges for workmen's compensation and group in-

surance. In 1938 these three charges taken together amounted to approximately 6 percent of total pay roll. In table 15 they have been included under item 11, "Insurance, taxes, and miscellaneous."

Company B.—In the case of company B, the accounting methods are of more than ordinary interest. "Actual" costs are compiled for each 4-week period for all grades of paper combined. These same costs, broken down by departments, are used for purposes of cost control. Actual costs are divided into three groups—raw materials; controllable (or variable) mill expense, including all of the items which should vary as production varies, such as direct labor, most of the indirect labor, supplies, fuel, social security taxes, etc.; and fixed expense, including depreciation, taxes, insurance, repair materials, labor for maintenance of the outside of buildings, administration, and selling expense other than commissions. The data presented below refer to these actual costs and have the same limitations as the actual cost figures used for company A.

Both the standard and the actual cost figures of company B are set up to indicate readily what portion, if any, of the fixed expenses have been covered. Thus they both emphasize the fact that the mill cannot afford to turn down any order on which the price will cover all of the variable expenses and some of the fixed charges unless other orders can be secured at higher prices.

Wage Rates and Labor Costs.

In general, direct labor costs in the two companies studied rose when wage rates were increased and fell when rates were cut. However, the relation between wage changes and changes in labor costs per unit of output in the plants of companies A and B has been neither simple nor direct but has been affected by a number of factors, two of which deserve special emphasis. In the first place, labor costs per unit depend to a considerable degree upon the volume of production of the mill as a whole. With a larger volume longer runs are possible, and the time required for starting and stopping operations is reduced.⁶

In the second place, technological improvements were made in the 1936–38 period, particularly in company B's plant, which reduced labor costs materially. A 19-percent increase in wage rates over this period in company B's plant was accompanied by an increase of only 6.4 percent in direct labor costs.

These conclusions must be expressed in general terms, since they are not based on labor costs for a homogeneous product but for all grades of paper produced. Labor costs per ton of production will obviously vary with the type of product. When a larger proportion of the output of the mill consists of grades which require the use of more labor in finishing operations, unit-labor costs naturally tend to increase. In similar fashion these costs depend upon the size of the paper machines, different grades of production being produced on machines of different sizes; in general, they are lower for grades produced on the larger machines. If grade labor costs had been available, this difficulty would have been avoided.

⁶ When business is scarce, orders will be put on the machines almost as they come in, and almost every change in the grade being turned out is costly. But when a mill has a large backlog of orders, longer runs of a single grade can be made at a considerable saving. When business is scarce, most mills will take orders for grades which cannot be run as efficiently as their regular grades or which require costly experimentation before a satisfactory sheet of paper is produced. A third factor is that a certain amount of time is lost each week in starting up and shutting down the continuous operations in a paper mill, but this time is no greater in a 6-day than in a 4-day week, so that production per hour tends to increase as the operating time per week increases. If a mill can run 7 days a week, the start-up and shut-down time are eliminated entirely, but this cannot be done for more than a few weeks in succession as shut-downs for repairs are required.

Since it was necessary to use costs for the entire plant output of all grades, changes in labor-cost figures from month to month may be due to changes in the proportions of different grades of paper made. In order to diminish the importance of fluctuations of this character, the labor-costs figures are presented, as averages of a group of periods usually separated by a wage change. This procedure assumes that monthly variations in the importance of different grades of paper in the output of each plant will tend to balance out in the course of several periods.

It is clear from table 13 that general changes in wage rates were accompanied in this plant of company A by changes of unit-labor costs in the same direction. There was, however, no precise correspondence in the extent of the changes. Between 1936 and the first eight periods of the following year, wages were increased by something less than 10 percent, but labor costs increased by only 5 percent. Undoubtedly the explanation of this divergence lies largely in the fact that the volume of production had increased by almost 30 percent.⁷ During the last five periods of 1937, after a further 5-percent increase in wages, labor costs advanced 8.8 percent. Again, the variation in production seems to account for the discrepancy; the volume of production fell off by more than 10 percent between the two parts of the year. During the first nine periods of 1938, unit-labor costs were 2.8 percent lower than during the latter part of 1937, in spite of the fact that no general change in wages had been made and that production had decreased. The change in labor costs between these two periods of time is probably explainable in terms of the changing composition of the output. Publication grades of paper, which require less labor per ton, accounted in the earlier months for approximately 63 percent of total tonnage; this proportion increased to more than 70 percent in the later months.

The explanation of the change in labor costs which occurred between the two parts of 1938 is not so clear. Following the general 7-percent reduction in wages, labor costs fell by only 2.3 percent. Operating labor costs fell by 3.2 percent. Changes in the volume and nature of production were insignificant and would not account for the differences. The fact that labor costs failed to decline as much as wage rates is probably connected with the increase in employment, following the adoption of the Fair Labor Standards Act, which has already been noted. It is probable that the addition of new employees, to the extent of almost 25 percent of the existing force, brought down the average level of efficiency by an amount sufficient to account for the discrepancy. If the last four periods of the year are considered separately, added weight is given to this hypothesis. For the tenth and eleventh periods, operating labor costs were almost 6-percent lower than in preceding months; during the last two periods when the Act was in effect, they were almost exactly the same as they had been during the early part of the year.

In summary it may be said that the movements in unit-labor costs have had a tendency to parallel those in wage rates, except for variations in the volume and nature of production. There is no evidence that systematic changes in labor policy or production methods were made to compensate for the changes in wage rates. This conclusion is consistent with the history of technical changes over the period.⁸

⁷ Table 11, p. 17.

⁸ See below, p. 41.

Company B.—For company B, the relation between general changes in wage rates and in labor costs is indicated in table 14. In each instance the 4-week accounting periods are divided into groups. The grouping conforms primarily with the dates of the general wage changes, although no change in wages intervened between the last half of 1937 and the year 1938.

TABLE 14.—*Wage rates and labor costs per unit, company B*

[1936 average=100]

Date	Amount of wage change (percent)	Direct labor costs	Indirect labor costs	Tonnage production per period	Average production per machine-hour
1936 (13 periods).....		100.0	100.0	100.0	100.0
Jan. 4, 1937.....	+8				
1937 (first 6 periods).....		102.5	97.1	128.7	105.3
July 4, 1937.....	+10				
1937 (last 6 periods).....		105.5	121.6	95.0	110.2
1938 (13 periods).....		106.4	114.5	91.9	109.2

† Approximately.

It is quickly apparent that the variations in direct and indirect labor costs bore little relation to the wage changes. The 8 percent wage increase of January 1937 was followed by a rise of only 2.5 percent in direct labor costs per ton and by an actual fall in indirect labor costs. The second wage increase, 10 percent, was followed by a rise of 2.9 percent in direct and of more than 25 percent in indirect labor costs. With no intervening wage change, direct labor costs rose slightly in 1938 while indirect labor costs fell by almost 6 percent.

Most of these differences in rate of change are probably explained by variations in the volume of production and by the gradual increase in "production per machine per hour" through technical improvements over the 3-year period. In general, indirect labor costs tended to vary inversely with the volume of production, when allowance is made for the general wage changes. This is not true, however, when a comparison is made between 1937 and 1938; from the data at hand, it is not possible to explain the decline which took place in these costs during the latter year. Direct labor costs tended to vary inversely with the average "production per machine per hour," again making allowance for the general increase in wages.

Neither direct nor indirect labor costs advanced as much as wage rates over the period as a whole. As a result of the two increases, wages were approximately 19 percent higher in 1938 than they had been in 1936. Direct labor costs were only 6.4 percent higher, and indirect labor costs 14.5 percent higher. Had the volume of production been as great in 1938 as in 1936, it is probable that indirect labor costs per ton would have been even lower in the latter year. The basic reason for the smaller increase in costs is undoubtedly to be found in the larger production per machine per hour, this being in turn primarily due to technological improvements which permitted the machine to be run at a more rapid pace.

Labor Costs, Total Costs, and Prices.

It is difficult to obtain a clear picture of the relation between the wage and price policies of company A and company B during a business cycle from the data secured in this survey. The impact of a prolonged period of low volume on wage and price policies is not disclosed in such a brief period as 1936-38. Moreover, the data assembled have certain limitations, already indicated. The cost and price information available is for the entire output of each mill rather than a single product, and hence changes in cost-price relationships are in part attributable to shifting proportions of different grades of paper in the total output. This difficulty, together with the practice of selling most of their paper on a contract basis with the possibility of a different price for each sale, makes it difficult to identify turning points in price trends for companies A and B. The statistics describe the effect of executive action on prices only indirectly. It is possible that one result is an overemphasis on the role of the market in paper prices as contrasted with company policy.

Nevertheless it is clear that cost structure and the competitive situations of these companies put definite limits on the importance of wages in determining prices. The cost structure of the paper industry not only relegates wage policy to a secondary position but also influences greatly the reaction of each company to market and competitive pressures.

Between 1936 and 1938 labor costs per unit of output ranged from 13.3 percent to 14.2 percent of total unit cost in company A and from 11.5 percent to 12.4 percent in company B, taking the averages for the group of accounting periods shown in tables 15 and 16. It is apparent that during this period they have represented a remarkably stable proportion of total costs despite the fact that wage rates in company A were increased by 16 percent and in company B by 19 percent. These increases were not fully reflected in the unit labor costs of the two companies, partly because increased volume made possible the more efficient utilization of labor and also, especially in the case of company B, because of the installation of labor-saving machinery.

Labor costs as a factor in total costs are overshadowed both in absolute magnitude and in the extent of their fluctuations by raw-material costs and by fixed expenses. Raw-material costs, primarily pulp, averaged a little less than 50 percent of total costs in company A and a little more than 50 percent in company B. Fixed expenses for these plants (supervision, administration, selling expense, interest, and depreciation) ranged from 12.8 to 17.2 percent of total costs in company A and from 13.3 to 20.1 percent in company B. (See tables 15 and 16.) Fixed expenses per unit decline when volume is expanding and increase when less paper is being produced. Even in so short a period as the 3 years 1936-38, volume changes were great enough to cause wide swings in fixed charges per unit.

The movements of unit raw-material costs have been, in general, opposite to those in fixed expenses per unit, rising when business is good and falling when business is poor. Yet raw materials are such a large proportion of total costs that the latter figures have followed closely the changes in raw-material costs. Labor cost changes have

in nearly every case been in the same direction as the changes in raw-material costs, but too small in size to influence appreciably the total cost figures.

TABLE 15.—*Cost components as a percentage of net price per ton, company A*

	1936, first 12 periods ¹	1937, first 8 periods ¹	1937, last 5 periods ¹	1938, first 9 periods ¹	1938, last 4 periods ¹
1. Average net price per ton.....	100.0	100.0	100.0	100.0	100.0
2. Raw materials, fibers.....	34.51	29.82	28.39	35.26	36.35
3. Raw materials, other.....	13.96	21.96	22.96	11.14	10.15
4. Total raw materials.....	48.47	51.78	51.35	46.40	46.50
5. Operating labor.....	12.68	12.08	12.41	12.71	12.76
6. Repair labor.....	1.17	1.18	1.36	1.32	1.43
7. Total labor.....	13.85	13.26	13.77	14.03	14.19
8. Supervision.....	2.25	1.77	1.96	2.44	2.26
9. Clerical.....	1.43	1.26	1.39	1.42	1.28
10. Supplies.....	6.31	5.29	5.96	5.45	6.49
11. Insurance, taxes, and miscellaneous.....	2.20	1.97	1.99	2.70	2.23
12. Fuel and water.....	3.70	3.26	3.26	3.83	3.88
13. Total manufacturing cost [4+7+8 to 12].....	78.21	78.59	79.68	76.27	76.80
14. Selling expense.....	3.09	3.20	3.02	2.98	3.04
15. Administrative expense.....	4.90	4.03	4.11	5.19	5.32
16. Interest.....	2.15	1.68	1.72	1.79	2.18
17. Depreciation.....	6.51	5.30	5.63	7.12	7.45
18. Balance, profit.....	5.14	7.20	5.84	6.65	5.21
Total fixed expenses (items 8, 15, 16, 17).....	15.81	12.78	13.42	16.54	17.21

¹ Accounting periods of 4 weeks each.

TABLE 16.—*Cost components as percentages of net price per ton, company B*

	1936 13 periods ¹	1937 first 6 periods ¹	1937 last 6 periods ¹	1938 13 periods ¹
1. Net price per ton produced.....	100.0	100.0	100.0	100.0
2. Book pulp.....	16.8	18.4	19.5	16.3
3. Other raw materials.....	39.7	41.3	40.1	39.4
4. Total raw materials.....	56.5	59.7	59.6	55.7
5. Direct labor.....	6.0	5.9	5.7	6.0
6. Controllable indirect and repair labor.....	² 6.0	5.6	6.5	6.4
7. Total labor.....	12.0	11.5	12.2	12.4
8. Controllable mill expense.....	11.3	10.0	11.2	10.2
9. Total controllable cost (4+7+8).....	79.8	81.2	83.0	78.3
10. Gross profit (1-9).....	20.2	18.8	17.0	21.7
11. Fixed mill expense.....	5.0	4.1	6.2	7.2
12. Administrative expense.....	5.0	3.9	4.4	5.0
13. Selling expense.....	4.7	2.9	3.7	4.4
14. Depreciation.....	3.1	2.4	3.1	3.5
15. Total fixed expenses.....	17.8	13.3	17.4	20.1
16. Operating profit (10-15).....	2.4	5.5	- .4	1.6
17. Other income less other charges.....	.1	.2	.4	.4
18. Loss on rejected paper.....	-1.1	- .2	- .2	- .4
19. Net profit or loss per ton.....	1.2	5.5	- .2	1.6

¹ Accounting periods of 4 weeks each.

² Approximate figure only for 1936, as the break-down was changed after the fifth period.

Changes in labor costs have not only played a minor part in each company's costs but total unit costs have not been an important factor in price policy. The officials of these two companies can play only a limited role in determining the prices of their products. In fact, prices are spoken of by company officials as fixed for them "by the market." However, the fact that company B has recently concentrated primarily on specialty grades of paper permits that concern a somewhat greater degree of freedom from price competition than company A, whose major product is publication grades of paper.

Despite the importance of the market in determining prices, costs and realizations for both of those companies have been closely related during the period 1936-38. This is due largely to the importance of raw materials in total costs, a fact to which reference has been made above. Pulp prices fluctuate widely; the average raw-material cost per ton for company A was over 20 percent larger for the last five periods of 1937 than it was during the year 1936. When shorter periods are compared, the differences are much greater. Changes in raw material prices are generally similar for all producers and vary in rough correspondence with activity in the paper industry. Consequently when business is good the prices of both raw materials and paper tend to rise, while when volume is declining both raw-material prices and paper prices decline. Thus costs and realizations for those companies have moved together more because both were under similar industry-wide pressures, than because prices were fixed on the basis of costs.

This tendency for prices of the finished product and the principal raw material to move together makes profits dependent primarily on changes in other manufacturing costs, largely labor and overhead costs. The situation is similar to that in the cotton textile industry which puts great emphasis on changes in mill margins. In the paper industry overhead costs represent more than half of these "other manufacturing costs." This fact, together with the dependence of unit overhead costs on the volume of production, accounts for the attitude of paper company officials toward volume, and for the common slogans in the industry, "keep the machines running" and "get the volume."

This situation also explains the price policies followed by these companies during severe depressions. According to officials of both companies the pressure of fixed charges is sufficient to require that every effort be made to sustain volume. To do this prices are cut in periods of severe and prolonged depression to a level which may just cover variable costs, i. e., materials and labor, and some part of fixed expenses. It is at such times, according to company officials, that costs play an important part in price policy, fixing a lower limit below which prices will not be cut. This function of costs is clearly recognized by company B which breaks down all of its cost figures into fixed and variable costs.

The importance which company B attaches to this distinction between fixed and variable expenses may be illustrated by a concrete example. During a period when the volume of production was low, the firm had an opportunity to secure a large order from a concern whose credit rating was low. After some deliberation, the company finally accepted the order on the basis of (1) cash on delivery for an amount carefully calculated to cover all the variable expenses, and (2) long-term notes for the balance of the price. The notes were never

paid, since the purchasing company went out of business before they fell due. Officials feel that no real loss was sustained, inasmuch as no other orders were obtainable at the time, and this order permitted them to maintain their organization and provide employment.

Only under these rather exceptional circumstances are changes in labor costs of any considerable importance in price policy. At such a time a reduction in wage rates will reduce variable costs and permit lower prices than would otherwise be possible. At no time during the 1937-38 recession did such a situation arise although volume declined rather sharply.

Changes in labor costs are important in the view of both companies to their cash position and to their profits.⁹ When business is depressed, the cash position of the company becomes an important management problem. Capital expenditures may be curtailed, raw material inventories reduced, and dividends suspended. The largest cash item remaining within the control of the company is the labor bill. The management of both companies feel that in such a situation even a small percentage reduction in wage rates is a substantial help.

TECHNOLOGICAL CHANGES

In both company A and company B, technological improvements reduced labor costs during the relatively short 1936-38 period, and in one of them the reduction was very substantial. In these two well-established paper companies, technological changes are made under a constant pressure for improvement in product and reduction in costs, and their effectiveness in limiting the influence of recent wage rate increases on labor costs has played only a minor role. Improvement in quality and reduction in overhead and materials costs were even more important objectives of technological improvements than savings in labor costs.

During the years 1936-38, company A spent substantial sums for new equipment and for improvements on older equipment. In the mill which has been the particular subject of this inquiry, the major changes were not such as to produce radical alterations in techniques or costs. In 1936, for example, when capital expenditures were approximately twice as great as in either of the other 2 years, the bulk of the money was spent for additional equipment of the same type as that already in use. The major consideration in deciding on capital expenditures is the rapidity of return expected from the investment. On all large investments the development engineers or the officials of the operating department discuss the proposal with the plant manager. If he approves, estimates of its cost and of its expected effect on paper costs and quality are submitted to the vice president in charge of operation of all mills. If he endorses the proposal, a request for an appropriation is made to the quarterly meeting of the board of directors, which makes the final decision.

The chief reason for the technological changes which were made is described by company officials as a desire to improve the quality or uniformity of the product or, in more general terms, to keep abreast or ahead of the technical procession in the industry. A substantial proportion of the changes made in this mill, as elsewhere throughout the industry, brought this about primarily by improvements which

⁹ The relation between wage policy and profits is discussed above, p. 29.

increased the speed of the machines. These developments brought about some saving in labor costs, but they resulted in even greater savings in overhead costs, and this appears to have been the more fundamental reason for their introduction. It must be borne in mind, however, that machine speed is less important in a mill making many small orders than in a mill running for long periods on one grade. In the former case start-up and wash-up time constitute a substantial part of the total machine time per order. Company B has one large modern machine installed in 1926 which is not considered suitable for small runs because of the high fixed charges that it carries, though it is more economical for large tonnage orders.

An examination was made of all the technical changes proposed or put into effect during the 3-year period by company A in the mill selected for study. There is no indication that the increases in wage rates exerted any influence on the amount or nature of the capital expenditures. Nor is there any indication that the desire to reduce labor costs was an important factor in bringing about capital expenditures. In only one instance was a prospective saving in labor costs emphasized as a reason for making a change, and this particular suggestion was not adopted.

Most of the major capital expenditures made by company B over the 3-year period, 1936-38, were also for the primary purpose of improving the quality and uniformity of the product. As in the case of company A, a related objective was to run the machines at higher speeds. One of the largest projects, for instance, increased the drying capacity of one of the paper machines. Since this had been the factor limiting the speed of this particular machine, higher machine-speed resulted with a consequent reduction of all important costs except raw materials. There were many other improvements of a similar nature.

From a survey of the technical changes actually introduced, and from information supplied by officials of the company, it is clear that there was little or no causal connection between increased labor costs and the introduction of improvements. Only one change during the entire period could be attributed mainly to an expected reduction in labor costs, and this was a minor purchase of equipment. To be sure, the increase in the speed of machines tended to lower labor costs, but this was not the most important effect of the changes, and it was not the primary reason for making them.

CHAPTER III

THE COTTON TEXTILE INDUSTRY

THE INDUSTRY AND THE COMPANY

It is particularly appropriate that the cotton textile industry be represented in the present survey, first, because the industry is one of the largest in the country and, second, because of the importance to the industry of the questions to which this survey is addressed, particularly those concerning the relation between wages, labor costs, and price policies of textile companies.

In 1937, 435,428 wage earners and 12,712 salaried employees were employed in cotton textile manufactures.¹ During that year, \$324,000,000 was paid out in wages and \$30,000,000 in salaries. The total value of the products of the industry was more than \$1,250,000,000, and the value added by manufacture almost \$570,000,000. The high degree of its concentration in New England and the South Atlantic States makes its prosperity of great importance to these areas. In 1937 approximately 90 percent of the wage earners in the industry were employed by firms in 11 States in these 2 regions.²

Generally speaking, cotton mills fall into three main groups—spinning mills, weaving mills, and mills engaged both in spinning and weaving. The overwhelming bulk of cotton fabrics is woven in integrated mills. It would be necessary to include one or more mills of each type if the inquiry were to be fully representative of the industry as a whole. Limitations of time, however, precluded such a wide sampling.

Since it was clear that at the most only two mills could be covered in the time allotted for this inquiry, and since it was also probable that differences in accounting methods or production techniques would make intercompany comparisons difficult, it was decided to concentrate attention upon two gray goods weaving mills owned by the same company—one in the North, the other in the South.

There is such a wide variety of finished cotton goods that it would have been almost impossible to secure data on them that would be comparable in any significant respect. By confining the inquiry to the more standardized gray goods, it has been possible to make more accurate comparisons not only between the two mills but also with other companies. Most of the data presented are for a single style of percale called hereafter style "P."

The company owning these mills has been engaged for many years in the manufacture and sale of cotton textile goods. It is a relatively

¹ All figures in this paragraph are taken from the 1937 Census of Manufactures. If "cotton narrow fabrics" and "fish nets and seines" were excluded, each item would be somewhat smaller. Whether these are included or excluded, the cotton textile industry employed more wage earners in 1937 than any other manufacturing industry, as classified by the census, except "steel works and rolling-mill products." See Biennial Census of Manufactures, 1937, vol. I., p. 34.

² The New England States except Vermont, and Alabama, Georgia, Mississippi, North Carolina, South Carolina, and Virginia. See *ibid.*, pp. 256-257.

large concern in the industry, with spinning and weaving mills in both the North and the South, as well as plants for finishing and dyeing. The output of the gray-goods mills is entirely absorbed by the finishing plants, none being sold on the open market.

Data were secured for the calendar years 1936 through 1938. In the textile industry, generally, these were years in which wage increases were followed by wage decreases, thus permitting the analysis of a variety of situations.

WAGE POLICY

The wage policy of company Z, as expressed by officials, is to go along with the rest of the cotton-textile industry, seeking neither to lead nor to lag. The data available indicate that the wage changes made by the company during 1936-38 have conformed to those of the industry as a whole.

The employees in both mills were organized at the end of 1938 and the unions have had some part in the determination of wage policy. The workers in the northern mill have been organized for several years in an independent union. Prior to 1938, the employees of the southern mill were unorganized, but in that year the company signed a contract with a union affiliated with the Congress of Industrial Organizations.

During the period 1936-38 there were three general changes in wage rates—two increases and one decrease—applying to all employees in each mill.³

These changes were as follows:

Northern mill:		
Nov. 30, 1936	-----	10 percent increase.
Mar. 29, 1937	-----	10 percent increase.
Feb. 14, 1938	-----	12.5 percent decrease.
Southern mill:		
Nov. 23, 1936	-----	9.7 percent increase.
Mar. 22, 1937	-----	7.5 percent increase.
July 18, 1938	-----	12.5 percent decrease.

A comparison between these changes and those reported currently to the Bureau of Labor Statistics by other cotton-textile companies indicates that their timing and amount conformed to the action of the industry generally. The company neither led the general trend nor lagged behind it.

The average hourly earnings of workers in these mills have also been similar to those of the cotton-textile industry generally.⁴ Data for the industry in table 17 are unweighted averages from the recent report published by the Bureau of Labor Statistics on "Wages in Cotton-Goods Manufacturing."

³ Both time and piece rates are used in the mills. Broadly speaking, most of the "direct labor," such as weavers or spinners, is paid on the basis of piece rates; most of those classified as "indirect labor," as well as those employed as sweepers, watchmen, yard labor, etc., are paid time rates. In some situations this diversity of methods of payment might well cause complications in statistical presentation. In the present instance, this was not a serious problem. The general wage changes applied, in approximately the same proportion, to all the employees in the mills and in the shops and yards, to time and piece workers alike. In the second place, the payment of piece rates in a cotton mill does not appear to lead to as great a variation in individual hourly earnings as might be the case in other industries. As one official of the company expressed it, "The real purpose of the piece rates is to give an inducement to the hands to keep their machines running." The speed of the machines tended by piece workers is set for them. For all practical purposes, it is permissible to use "normal piece-work hourly earnings" as synonymous with "actual piece-work earnings divided by number of hours worked."

⁴ As noted in the next section, movements of wage rates and average hourly earnings have been nearly identical in this company.

TABLE 17.—Average hourly earnings of cotton-textile employees

[Cents per hour]

	North		South	
	All in- dustry ¹	Company	All in- dustry ¹	Company
July 1936.....	41.8	41.6	34.6	35.6
July 1937.....	50.0	50.4	39.7	42.7
August 1938.....	44.6	44.5	36.6	² 40.3

¹ Source: Bureau of Labor Statistics.² The September figure for this mill is more nearly comparable. It is 37.9 cents.

The wage levels in the northern mill of the company have been maintained throughout the period at a level approximately equal to that of the northern section of the industry as a whole. Earnings in the southern mill have tended to be somewhat higher than those prevailing in southern plants generally. In this comparison, the spread of almost 4 cents between the company's wages and those of the industry in August 1938, is not fully representative of the company's situation. The full effects of the July decrease in the southern mill had not yet been felt; the September figure for this mill was 37.9 cents, a closer comparison.

In comparing northern and southern earnings it is necessary to point out that this company, like many others, maintains a "village" in connection with its southern mill.⁵ Outlays for upkeep of this village are considerably in excess of the receipts from rents or other charges. From comparisons of the level of rents and the quality of the housing it appears likely that the "village" represents an addition to incomes. To some extent (although it cannot be measured precisely in monetary terms) the difference in money earnings should be corrected for this addition to "real" earnings in the South.

WAGE RATES AND AVERAGE HOURLY EARNINGS

In these two plants wage rates and average hourly earnings have been closely related.⁶ The increases of 10 percent in the northern mill on November 13, 1936 and March 29, 1937, were followed by increases in average hourly earnings of 10.6 percent and 9.6 percent, respectively. In the southern mill the increase of 9.7 percent made on November 23, 1936, was followed by a 9.2 percent rise in average hourly earnings, and the 7.5 percent increase of March 22, 1937, by an 8.1 percent hourly earnings increase.

The full effect of the wage decrease of 12.5 percent was not felt immediately in the southern mill; average hourly earnings were only 6.7 percent lower in the month following than in the month preceding it. However, this was almost wholly due to a delay in applying the wage change to all the workers, since by the next month the decline in earnings, as shown in the table above, was 12.2 percent. The decrease of 12.5 percent in wage rates in the northern mill was followed by a decline of only 10.3 percent in average hourly earnings. The reasons for this difference could not be learned from the company's records.

⁵ For a more complete discussion of differences between the northern and southern mills, see below pp. 54-59.⁶ See table 18.

TABLE 18.—*Wage rates and average hourly earnings, cotton textile company, 1936-38*

NORTHERN MILL

Date of wage change	Percent change in wage rates	Percent change in average hourly earnings—month preceding to month following wage change
Nov. 13, 1936.....	+10	+10.6
Mar. 29, 1937.....	+10	+9.6
Feb. 14, 1938.....	-12.5	-10.3

SOUTHERN MILL

Nov. 23, 1936.....	+9.7	+9.2
Mar. 22, 1937.....	+7.5	+8.1
July 18, 1938.....	-12.5	-12.2

¹ This figure is for September 1938 because the wage rate change of July 18, 1938, was not fully in effect in August.

Apart from the effects of wage rate changes, average hourly earnings were remarkably stable during the period covered despite substantial fluctuations in the volume of operations.⁷ A rise of nearly 3 percent in average hourly earnings in the southern mill during the last months of 1937 was probably due to a cut in the number of shop and yard employees, a group whose earnings average lower than those of the "inside" workers.

TABLE 19.—*Average hourly earnings, cotton-textile company, 1936-38*

[Cents per hour]

Date	Average hourly earnings		Date	Average hourly earnings	
	Northern mill	Southern mill		Northern mill	Southern mill
1936—January.....	41.7	36.0	1937— July.....	50.4	42.7
February.....	41.6	36.1	August.....	50.0	42.8
March.....	41.6	35.7	September.....	50.7	43.3
April.....	41.8	35.8	October.....	51.2	43.5
May.....	41.7	35.9	November.....	51.0	43.6
June.....	41.6	35.8	December.....	50.9	44.0
July.....	41.6	35.6	1938—January.....	49.6	43.5
August.....	41.5	35.6	February ²	47.8	43.2
September.....	41.6	35.6	March.....	44.5	43.3
October.....	41.6	35.7	April.....	44.8	43.3
November ¹	41.7	35.7	May.....	45.1	43.3
December.....	46.0	39.0	June.....	44.9	43.2
1937—January.....	45.9	39.2	July ⁴	44.4	42.4
February.....	46.0	39.5	August.....	44.5	40.3
March ²	46.7	40.1	September.....	44.8	37.9
April.....	50.4	42.7	October.....	44.6	37.9
May.....	50.2	42.9	November.....	44.5	37.8
June.....	50.1	42.8	December.....	44.4	38.1

¹ On Nov. 13, 1936, wage rates in the northern mill were increased 10 percent, and on Nov. 23, 1936, they were increased 9.7 percent in the southern mill.

² On Mar. 29, 1937, wage rates in the northern mill were increased 10 percent, and on Mar. 22, 1937, they were increased 7.5 percent in the southern mill.

³ On Feb. 14, 1938, wage rates in the northern mill were decreased 12.5 percent.

⁴ On July 18, 1938, wage rates in the southern mill were decreased 12.5 percent.

⁷ See table 19.

There is no evidence that efforts were made to economize on the use of the more highly paid grades of labor when wage rates were increased, nor is there any evidence of converse substitutions when rates of wages fell.

Actual weekly earnings, as shown in table 2, appendix A, have varied more widely. The major movements in these figures can largely be explained by changes in wage rates or in the length of the normal working week of the mills.

WAGE RATES, LABOR COSTS, TOTAL COSTS, AND PRICES

For accurate comparisons of changes in wage rates, costs and prices, it is necessary to select one particular style of cloth and to assume that changes in its cost structure and its prices are representative of other grades. It is also necessary to rely upon "standard" as opposed to actual costs, and to assume that these standard costs closely approximate the actual costs, which cannot be computed for particular grades of cloth. In order to evaluate the significance of this use of "standard" instead of "actual" costs, it is necessary to describe briefly the accounting procedures used by the company.

Accounting Procedures.

Cost accounting in this company is designed to serve primarily the functions of departmental or plant control. Various components of cost are estimated in advance annually. Estimated overhead expenditures are prorated among the various plants of the company. For example, central administrative expense is allocated on the basis of a combination of plant valuation and number of employees. Depreciation is allocated to specific items of equipment.

Expected days of production are likewise estimated, involving, of course, an estimate of the volume of production. Such estimates are made on the basis not only of the immediate outlook for the industry but also of the normal or customary experience in the past.

Within the individual plant, a further subdivision of estimated expenditures is made between departments. With some items, such as "steam," allocation is on the basis of use, steam being predominantly important in slashing operations. Depreciation is calculated with reference to specific items of equipment. The components of burden, including indirect labor, are allocated to departments on the basis of the estimated volume of output.

For purposes of departmental or plant control, variances from budgeted expenditures are computed monthly. These variances logically fall into two main groups: those that are due to differences between actual and estimated volume of production and variances in "direct" cost items, notably labor and materials. Obviously, these two groups of items have quite different implications for production control. It should be noted that the variances are computed for the plant or department as a whole. Only in exceptional circumstances would it be possible to tie these variances to particular orders or particular grades or styles of cloth.

Standard costs are calculated annually for each of the many varieties of yarn and cloth produced, but if there is a major change in an important cost item, such as a general revision of wage rates, they will be recomputed accordingly. Since the basic raw material, cotton, accounts for a large and widely fluctuating share of the total cost of

the finished goods,⁸ it is impossible to include a constant (per yard or per pound) figure for raw cotton in an estimate of standard costs which is to prevail for any period of time. Hence "standard costs," as the term will be used in this chapter, refers only to "manufacturing costs," exclusive of the costs of raw cotton. These "manufacturing costs" may be expected to remain relatively stable, barring major changes in labor costs.

Standard costs for each grade of cloth are built up by departments. Burden calculated for the budgeted annual output is allocated to specific grades of cloth or yarn on what is essentially a machine-hour basis. Most of the direct labor is on a piece-work basis. Other direct labor is easily estimated since machine speeds are known, percentage of stoppages can be closely approximated, and the number of spindles or looms tended by each worker is fixed. Direct materials—i. e., sizing—can similarly be estimated very precisely. A summation of the "direct" and the "burden" items yields the standard costs per yard.

Useful as these standard costs are for intraplant purposes, they do not afford data for answering many of the questions with which this inquiry is concerned. "Direct labor" costs are only one of the items which go to make up "labor costs," in the sense of those items which will be immediately affected by general changes in wage rates. Not only "indirect labor" (including such workers as oilers and cleaners) but many other items largely made up of "labor costs" are subsumed under the general heading of "Burden" and allocated, along with administrative expenses, depreciation, etc., on a totally different basis. In the ordinary standard-cost estimates it is impossible to disentangle these "labor" items.

Fortunately, for one style of cloth, a percale, there are available periodic break-downs of standard costs which permit the segregation of most labor costs. For this percale, style "P," standard costs are broken down into detailed items, such as administration, telephone, insurance, power, indirect labor, etc. With one exception, these itemized estimates are available for the month preceding and the month following each general wage change. They are not entirely satisfactory inasmuch as some of the items—e. g., repairs—include supplies and materials as well as labor, but they unquestionably provide a clearer picture than could otherwise be secured.

It would be desirable to have actual as well as standard manufacturing costs for each style of cloth, but this is both theoretically and practically impossible. When many styles are being run through the mill simultaneously, variances from standard or budgeted items cannot be ascribed to particular styles or grades. This is particularly true of the burden items, which to a large extent depend simply upon the total volume of production.⁹

Comparisons were made, however, between standard direct labor charges and direct labor variances. In only a few months during the 3-year period did these variances, in either the northern or the southern

⁸ See below p. 52, table 23.

⁹ A few examples may serve to illustrate both the importance and the limitations of standard-cost figures in making decisions. The price which can be secured for any given grade of cloth is compared with total costs, including raw-material costs as well as standard manufacturing costs. It is fully recognized, however, that full coverage of costs is an ideal not always attainable. If, for instance, there is a choice between grades of cloth to be produced on the same looms, considerable reliance is placed upon a comparison of standard costs as a guide to the relative amounts of burden items which can be absorbed. If, on the other hand, the question is one of running a loom or shutting it down entirely, attention is focused primarily upon the variable costs, burden items being excluded from the calculation.

mill, exceed 2 to 3 percent. Nearly all the exceptions could be ascribed to special circumstances. For example, some of the most marked variances were found in the northern plant during 1938, when a part of the mill was turned over to the production of other fabrics and special allowances were made to workers during the transition period.

To arrive at estimates of "total cost" it is necessary to add to these standard manufacturing costs a variable amount per yard depending upon the prevailing price of cotton. This can be arrived at for any grade of cloth by applying a constant multiplier (based upon the known amount of cotton in each yard of that grade) to the market price of cotton of a given grade and staple. The sum of this product and the standard manufacturing costs per yard yields an estimate of total costs which is used for comparison with the selling price of the cloth.

Two types of information on profits were available: annual profit or loss for the entire company, and monthly accounting estimates of profit per yard for particular grades of cloth based on "standard" rather than "actual" manufacturing costs. Neither is appropriate for the purposes of this report. The annual figures are based on the operations of all the plants of the company. The per-yard figures do not take into account the necessary allowances for unabsorbed or over-absorbed burden. From a study of related data it is clear that fluctuations in actual profits per yard would tend to be in the same direction as those in the per-yard accounting profits, but of greater magnitude.

Wage Rates and Labor Costs.

The effect of wage rate changes on labor costs during the 3-year period may be examined in terms of the standard cost figures for style "P." No significant changes were made in the specifications for style "P" between 1936 and 1938. Moreover, it formed a sizable proportion of the total output of each mill.

In both mills general changes in wage rates resulted in almost exactly proportionate changes in labor costs per yard. Changes in direct, indirect, and total labor costs per yard of style "P" between the months for which standard costs were computed are compared with wage-rate changes in the 1936-38 period in table 20.

TABLE 20.—*Wage rates and labor costs, cotton textile company, style "P" percale*

NORTHERN MILL

Periods of standard cost changes	Percent change in direct labor cost	Percent change in indirect labor cost	Percent change in total labor cost	Percent change in wage rates
January 1936 to January 1937.....	+9.5	+16.4	+11.2	+10.0 ¹
January to April 1937.....	+10.3	+9.4	+10.0	+10.0 ¹
April 1937 to March 1938.....	-11.8	-20.0	-13.9	-12.5

SOUTHERN MILL

January 1936 to May 1937.....	+18.8	+17.5	+18.5	¹ +17.9
May 1937 to August 1938.....	-14.1	-10.6	-13.4	-12.5

¹ This comprised 2 successive increases of 9.7 and 7.5 percent, respectively.

In the northern mill the two 10-percent increases in wages were followed by increases of 11 percent and 10 percent, respectively, in total labor costs. The 12.5 percent wage decrease was followed by a decline in total labor costs of 13.9 percent.

Standard cost figures for the period between the two wage increases were not available for the southern mill. Together, the two increases represented a 17.9 percent rise in wage rates. After the second, total labor costs were 18.5 percent higher than they had been before the first wage increase. The 12.5 percent wage decrease of July 18, 1938, was followed by a decline of 13.4 percent in total labor costs.¹⁰

The conclusions of this section may be summarized as follows: Changes in general rates of wages were followed by changes in almost exactly the same proportions in the labor costs per yard of style "P." This relation held true for both mills and for each measure of labor cost which was available.

Labor Costs, Total Costs, and Prices.

In both northern and southern plants, changes in labor costs were the principal factors in changes in standard manufacturing costs per yard, but they were far less important in changes in total costs than were the costs of raw materials. Prices of both raw materials and gray goods are market-determined and the company has no control over them. Such correspondence as exists between costs and prices is explained by the similarity of the forces determining the prices of raw cotton and of gray goods. Labor costs play little or no part in price determination at least in the short run; rather wage rates are changed as a result of the pressure of falling prices, and more important still, of declining mill margins. Changes in labor costs, do, however, influence the margin of profit.

Total costs of production per yard in the cotton textile industry are commonly regarded as comprised of two distinct segments—raw-material costs and "manufacturing costs." Raw-material costs fluctuate widely in response to changes in the price of cotton, while manufacturing costs per yard which constitute the remainder of total costs, are relatively stable.

The proportion which manufacturing costs constitute of total costs is constantly changing. It is high when raw material costs are low and vice versa. During the period 1936–38 manufacturing costs in the northern mill varied from 48 to 63 percent of total costs, and in the southern mill from 49 to 64 percent. (These figures are for all styles of cloth combined.)

Over the period studied, labor costs formed a fairly constant percentage of manufacturing costs, amounting to somewhat more than one-half of the total for style "P". For the northern mill the ratio

¹⁰ Even in the detailed break-down of style "P" costs, there are a number of items other than direct and indirect labor which include "labor" elements, e. g., "repairs," "steam," "autos," etc. Three of these call for special mention. Contributions for unemployment compensation and for old-age insurance vary directly with payments for labor, yet in the accounts of the company they are grouped with and allocated on the same basis as burden items. Liability insurance, which occupies an intermediate position in that over a period of time it may vary with factors other than pay rolls, is also included in burden. If these three components were included in total labor costs, the latter would have been increased by approximately 6 percent. For earlier periods, this percentage would have been smaller inasmuch as unemployment compensation contributions increased gradually to their maximum and old-age contributions were not payable until 1937.

A more detailed break-down of those burden items which included a substantial labor factor was available for two dates, one in 1938 and the other in 1939, for the northern mill. On the assumption that the relative proportion of labor in these various cost components remained the same over the years 1936–38, calculations were made of the relation between wage changes and "total labor costs" including these burden items, and they were found not to differ significantly from the results obtained by considering only the two principal components, "direct labor" and "indirect labor."

varied from 54.9 to 57.6 percent and for the southern mill from 48.6 to 51.7 percent. In part this relative stability is due to the fact that "other manufacturing costs" include some elements of labor cost and consequently vary in accordance with changes in wage rates.

Table 21 compares changes in labor costs with changes in total manufacturing costs for style "P" percale on a per-yard basis. Figures are shown for each period preceding and following general wage changes, with the exception that data for the southern mill were not available for the period between the two successive wage increases. It is evident that, for this period at least, changes in standard manufacturing costs roughly paralleled the trend of labor costs.

TABLE 21.—Standard labor and total manufacturing costs, style "P" percale, 1936-38

[Cents per yard]						
NORTHERN MILL						
	Labor costs	Amount change over previous period	Other manufacturing costs	Amount change over previous period	Total manufacturing costs	Amount change over previous period
January 1936.....	2.24	-----	1.71	-----	3.95	-----
January 1937.....	2.49	+0.25	1.98	+0.27	4.48	+0.53
April 1937.....	2.74	+ .25	2.02	+ .04	4.76	+ .28
March 1938.....	2.36	-.38	1.94	-.08	4.30	-.46
SOUTHERN MILL						
January 1936.....	1.89	-----	2.00	-----	3.89	-----
May 1937.....	2.24	+0.35	2.14	+0.14	4.38	+0.49
August 1938.....	1.94	-.30	1.81	-.33	3.75	-.63

The relative importance of the various elements constituting total manufacturing costs per yard for style "P" is shown in table 22 for the latter part of 1938.

TABLE 22.—Manufacturing costs per yard, style "P" percale—percent distribution of selected cost items, latter part of 1938

[Cents per yard]					
	Northern mill	Southern mill		Northern mill	Southern mill
Direct labor.....	41.8	40.5	Direct materials.....	1.6	2.3
Indirect labor.....	13.1	11.2	Supplies.....	3.3	2.6
Administration.....	1.3	1.3	Supervision.....	3.8	3.3
Taxes.....	2.9	4.5	Power.....	10.6	11.9
Depreciation.....	5.3	9.9	Steam.....	.4	.4
Interest.....	.6	.7	Social security.....	3.0	2.8
Yards.....	.1	.2	Liability insurance.....	.5	.3
Maintenance.....	.9	.2			
Repairs.....	4.9	3.0	Total.....	95.2	95.9
Office.....	1.1	.8			

As has been stated, raw material prices fluctuate much more widely than do manufacturing costs. They are, moreover, for all practical purposes out of control of the individual manufacturer. Their level is largely determined by operations in the organized cotton exchanges in which no single buyer can appreciably affect the market. The extent of variation in the costs of raw materials entering into style "P" is

shown in table 23. Since raw material costs fluctuate much more widely than do labor or "other manufacturing" costs and are over twice as large as either of them, they constitute the principal variable element in total costs.

TABLE 23.—*Raw cotton cost per yard and ratio to total costs, style "P" percale, 1936-38*

	Index of raw material cost per yard (1936 average=100)		Ratio of raw material cost to total cost (percent)	
	Northern mill	Southern mill	Northern mill	Southern mill
1936—January.....	96	90	46	45
February.....	98	97	47	47
March.....	103	97	49	48
April.....	96	99	47	48
May.....	97	98	47	47
June.....	96	97	46	47
July.....	97	100	47	48
August.....	99	97	47	48
September.....	108	110	49	52
October.....	104	103	49	49
November.....	103	104	49	49
December.....	105	102	48	48
1937—January.....	101	101	45	46
February.....	103	101	45	45
March.....	102	104	45	47
April.....	122	(1)	48	(1)
May.....	122	(1)	48	(1)
June.....	113	116	46	48
July.....	116	116	47	48
August.....	116	118	47	49
September.....	115	113	47	48
October.....	92	79	41	39
November.....	71	72	35	36
December.....	74	73	36	37
1938—January.....	73	73	36	37
February.....	73	73	36	37
March.....	71	71	36	37
April.....	75	71	39	37
May.....	75	70	38	37
June.....	68	64	38	38
July.....	73	66	38	38
August.....	72	63	38	37
September.....	68	64	37	38
October.....	65	64	35	38
November.....	66	63	36	38
December.....	65	63	35	37

¹ No data.

There is, also, a fair degree of correlation between price trends in the gray goods and raw materials markets. Prices of gray goods, such as that of the style "P" percale studied, are largely beyond the control of the individual establishment and are determined in a highly competitive market. Since, to a considerable extent, changes in the same supply and demand conditions affect both the gray goods and raw cotton markets, a certain degree of correspondence between gray goods and raw material prices would be anticipated.

To a large extent, therefore, the difference between the price of the finished goods and of the raw material is beyond the control of any individual textile producer. This difference, which is commonly referred to as the "mill margin," is of critical importance. If the mill margin exceeds manufacturing costs, operations are profitable; if it falls below manufacturing costs, a loss results. A decline in the mill margin, therefore, means a reduction in profits, except as manufacturing economies can be achieved.

With a given mill margin and in the absence of any substantial change in technology or in unit overhead, wage rates and labor costs directly affect the profit margin. In fact the difference between a profit and a loss may depend upon what is done with regard to labor costs. It is evident that pressure to reduce labor costs will be encountered when mill margins and profits are declining, and that conversely wage increases which would raise labor costs will be deemed feasible only when mill margins and profits are rising. As a matter of fact, changes in wage rates whose timing is guided largely by the action of the industry generally tend in this company to lag materially behind changes in mill margins and in profits. Thus, wages were increased in November 1936 and March 1937 after profits had been rising sharply for a considerable period and they were cut in February 1938 in the northern mill and July 1938 in the southern mill after mill margins and profits had been drastically reduced. In other words, changes in wage rates and labor costs do not have any direct effect upon prices, at least in the short run, but instead themselves reflect the trends in raw cotton and gray cloth prices and in company earnings.

TECHNOLOGICAL CHANGES

An inquiry which is limited to the experience of a company over a period of only 3 years cannot be conclusive on questions of technological change. Changes involving large capital expenditures on the part of a company are frequently concentrated at one mill, major changes not coming quickly on the heels of one another. For the company which was studied, the years 1936 to 1938 were not a period during which machine installations on a large scale were made. In order to secure valid objective evidence of the causal factors in technological changes and of the effects of these changes, it would be necessary to survey the experience of a much longer period of time.

No definitive conclusions can be drawn, therefore, with reference either to the reasons for, or the effects of, the introduction of technological changes. Officials of the company state that such changes are made "when they seem to be called for." It is the policy of the company to make them when the expected savings outweigh the costs, the decision being made in the light of current and prospective business conditions. Expected savings in labor costs are an important consideration; other things being equal, such savings are higher when wage rates are high. The absolute level of wages, however, is not the sole nor, in many situations, the most important criterion. For example, the decision between investment in the northern or the southern mill is based primarily upon the expected profitability of operations in the two regions, rather than upon the difference in the prevailing wages. In other words, it is not so much a question of where the greatest savings in costs can be effected as, rather, whether such savings as can be made will reduce costs to an extent that will permit the company to compete with other firms in the industry and to operate profitably.

The cash position of the company has been such that variations therein have not been an important consideration in the timing or nature of technological changes.

Only two important technological changes were introduced during the period. The installation of one of these, improved spinning

equipment in the southern mill, has not yet been completed and only estimates of the expected savings in costs are available, but it is believed that the cost of manufacturing yarn will be reduced by more than 25 percent. Had this change been effective in the latter part of 1938, standard manufacturing costs of style "P" would have been approximately 16 percent lower than they were.

Looms of a newer type have been partially introduced in both mills. The new looms can be operated about 20 percent faster than the old, and adjustments have been made in the piece rates of operators of these machines which have kept their hourly earnings in line with those of the operators of the older looms, direct labor costs per yard for cloth woven on the new looms having been reduced substantially as a result. Somewhat paradoxically, however, standard costs have increased as a result of this change. Depreciation charges on some of the older looms had been reduced to zero, even though they were in steady use. There is good reason to believe that the accounting procedures understate the savings and overestimate the added charges resulting from the introduction of the newer equipment. If other accounting methods, particularly with respect to depreciation charges, had been followed, a gain rather than a loss might well have been shown.

REGIONAL DIFFERENCES

Many of the differences between the northern and southern mills of the company have already been referred to in the discussion of specific problems. It is the purpose of this section to draw together this material as well as to present some additional data bearing on the question of regional differences. The most important differences between the two mills are in standard manufacturing costs. These depend almost wholly on differences in labor costs, which in turn depend upon differences in wage rates and earnings. These differentials favor the southern mill. Differences in prices, raw materials costs, etc., are relatively unimportant.

Regional comparisons may be largely vitiated if the conditions of employment or production vary markedly. In the present case such variations are not significant. With minor exceptions the techniques of production in the two mills are similar. Job standards do not differ appreciably, normal hours of work are identical, and the distribution of workers among the various departments is approximately the same. There is only one important difference which needs to be taken into account in making intermill comparisons. This factor, to which reference has already been made, is the company-owned "village" adjacent to the southern mill. No counterpart to this is to be found in the northern mill.

The analysis of regional differences may conveniently be considered under seven headings: raw material costs, prices, average hourly earnings, occupational differentials, labor costs, standard manufacturing costs, and profits. Limitations of space prevent more than a summary consideration of each of these points.

Raw-Material Costs.

The available data on raw-material costs are in terms of cost per yard of finished cloth. Comparisons are made for only one grade of cloth, style "P", since otherwise varying raw-material costs might

reflect mainly changes in the proportions of the different grades produced.

It might be expected that the cost of raw cotton would be appreciably lower in the South than in the North, because of lower transportation costs. Actually, the differences for this particular company have been unimportant, averaging approximately one-quarter of 1 percent of the selling price per yard of style "P." For the most part this is undoubtedly due to the relative unimportance of transportation costs in relation to total costs.

Prices.

Since all the gray goods produced by this company, including its entire output of style "P" cloth, are used in other mills owned by it, the gray goods prices available are not market prices actually received, but are based largely on prices paid by the company for gray goods purchased in the open market for use in its northern and southern finishing mills. In general the prices paid by the northern and southern mills for style "P" percale have been almost identical throughout this period.

Average Hourly Earnings.

If money payments alone are considered, average hourly earnings were normally about 17 percent higher in the northern mill than in the southern mill during the 1936-38 period. If village expenditures in the southern mill could have been taken into account, this differential probably would have been somewhat smaller.

Wage rates and average hourly earnings in the northern and southern mills have already been discussed in some detail. It is only necessary to summarize this material with special attention to regional differentials.

For the accounting periods preceding and following each of the two wage increases, average hourly earnings in the northern and southern mills were as follows:

	Northern	Southern	Percentage northern exceeds southern
	<i>Cents per hour</i>	<i>Cents per hour</i>	<i>Percent</i>
October 1936 ¹	41.6	35.7	16.4
January 1937.....	45.9	39.2	17.1
February 1937 ²	46.0	39.5	16.4
April 1937.....	50.4	42.7	18.0

¹ Wage rates were increased 10 percent in the northern mill on Nov. 13, 1936, and 9.7 percent on Nov. 23, 1936, in the southern mill.

² Wage rates were increased 10 percent in the northern mill on Mar. 29, 1937, and 7.5 percent on Mar. 22, 1937, in the southern mill.

The fact that the wage decrease was put into effect at different times in the two mills makes comparisons of later periods more difficult. For the 10 months from April 1937 through January 1938 average hourly earnings for the northern mill were 17.7 percent higher than those in the southern mill. Following the decrease of 12.5 percent in the northern mill, on February 14, 1938, earnings for that mill were only 3.5 percent higher than the southern average for the next 5 months. In the last 4 months of 1938, after wage rates had been cut

in the southern mill, earnings in the northern mill were 17.6 percent higher than those in the southern plant. Over the entire period 1936-38 earnings in the northern mill averaged approximately 17 percent higher than those in the southern mill.

All of these comparisons of money earnings overstate the differential existing between "real incomes"¹¹ because of the "village" expenditures made by the southern mill in excess of rents collected for which no precise adjustments can be made. The houses owned by the company are occupied not only by millworkers but also by supervisors, clerical employees, etc. All expenditures for the village do not, therefore, accrue to the advantage of wage earners. Workers would probably have to pay more for the same living accommodations outside of the village, but they might not choose to increase their expenditures for housing by this amount. Or again, a dollar spent by the company on housing may have been spent more or less efficiently than it would have been by the community as a whole. For these reasons, and probably for others as well, "village expenditures" cannot be equated to cash earnings in monetary terms.

Occupational Rates.

Average hourly earnings for selected occupations in the two mills are presented in table 24. The rates are those prevailing during the latter part of 1938, following the 12.5 percent decrease in wages made in both plants that year.

TABLE 24.—Average hourly earnings for selected occupations, latter part of 1938

	Northern mill	Southern mill
	<i>Cents</i>	<i>Cents</i>
Picker hands.....	38.1	30.0
Card tenders.....	40.0	31.5
Roving men.....	38.1	31.1
Section men.....	50.6	49.4
Frame hands:		
Slasher tenders.....	47.5	40.0
Intermediate tenders.....	47.5	42.5
Fine frames.....	42.4	40.0
Scrubbers.....	31.3	25.8
Section men (spinning).....	50.6	49.4
Spinners:		
2,448 spindles.....	42.4	31.9
2,016 spindles.....		
Doffers:		
3,700 bobbins.....	41.8	41.8
4,400 bobbins.....		
Frame cleaners.....	34.7	31.2
Warper tenders.....	42.4	35.9
Slasher.....	53.9	38.5
Loom fixers.....	63.5	50.8
Weavers.....	47.7	41.6
Battery hands.....	34.7	31.1
Outside help.....	40.0	25.0

It will be seen that the differentials are not uniform for all occupations, ranging from practically zero for section men to almost 40 percent in the case of slasher tenders, although in every occupation employees in the northern mill receive more than those in the southern plant.¹² Under the circumstances, an "average differential" falls far short of telling the whole story.

¹¹ Not in the sense of money earnings deflated by cost of living. "Real wages" or "real incomes" in this sense have not been considered in the present study.

¹² The rate is the same for doffers, but those working in the southern mill have more bobbins to handle and hence are being paid less for the same amount of work.

Labor Costs.

In table 25, a comparison of labor costs per unit of output is presented for style "P" cloth. The labor costs given in the table are standard costs for direct and indirect labor, but, particularly insofar as direct labor is concerned, variances from these costs have been negligible.¹³ The figures shown are for three periods during which the "normal" wage differentials were in effect: after each of the two wage increases, and after the wage decrease. The differential in labor costs averages a little more than 20 percent, as compared with a difference of about 17 percent in average hourly earnings. According to company officials, this is due primarily to a greater efficiency of the employees in the southern mill, although the relative newness of the southern machinery may be partially responsible.

TABLE 25.—*Style "P," direct and indirect labor costs*

	Southern mill	North- ern mill	Differ- ence	Percent- age northern exceeds southern
	<i>Cents per yard</i>	<i>Cents per yard</i>	<i>Cents per yard</i>	
January 1936.....	1.89	2.24	0.35	19
May 1937.....	2.24	2.74	.50	22
August 1938.....	1.94	2.36	.42	22

Again, some allowance should be made for village expenditures in the southern mill before making comparisons between northern and southern labor costs, but it is not possible to put this allowance in precise terms.¹⁴ Over the period 1936-38, approximately a quarter of a cent per yard of style "P" was charged to "village" in the standard costs. If this were all to be added to labor costs, it would account for a substantial part of the differential in direct and indirect labor costs between the two mills. But, as we have seen, it would be unjust to charge the whole of this to labor costs.

Total Manufacturing Costs.

In table 26, data were presented on "Other manufacturing costs" and "Total manufacturing costs" for the two mills. For purposes of interregional comparisons, it is desirable to subdivide these costs in somewhat more detail. The results are presented in table 26. Standard manufacturing costs of style "P" per yard have been divided into three groups: direct and indirect labor costs, other manufacturing costs with a substantial "labor content," and manufacturing costs with no substantial "labor content." In the second group are included such items as repairs, maintenance, protection of property, etc., as well as payments for Social Security and liability insurance; in the third group, items such as power, supplies, taxes on property, depreciation, central administration, etc. Village expenditures in the southern mill have been shown separately. The data refer to one accounting period in each of the 3 years, comparable for the two mills with respect to the wage increases and decreases.

¹³ There is no reason to believe that the results would be substantially altered if the labor costs included in other accounting items could be added in.

¹⁴ This allowance would not, of course, affect the comparisons made in the preceding paragraph between the North and South differentials in earnings and in labor costs. It does affect alike the differentials between North and South, whether in earnings or in labor costs.

TABLE 26.—*Manufacturing costs, style "P"*

	Direct and indirect labor costs	"Labor content" manu- facturing costs	Other manu- facturing costs	"Village" costs	Total manu- facturing costs	Percent- age north- ern exceeds south- ern
	<i>Cents per yard</i>	<i>Cents per yard</i>	<i>Cents per yard</i>	<i>Cents per yard</i>	<i>Cents per yard</i>	
1936 period:						
Northern mill.....	2.24	0.46	1.26	-----	3.96	1.8
Southern mill.....	1.89	.38	1.37	0.25	3.89	-----
1937 period:						
Northern mill.....	2.74	.62	1.39	-----	4.75	-----
Southern mill.....	2.24	.43	1.44	.27	4.38	8.4
1938 period:						
Northern mill.....	2.36	.56	1.38	-----	4.30	-----
Southern mill.....	1.94	.34	1.51	1-.04	3.75	14.6

¹ Some village costs allocated to other items, particularly depreciation, taxes, and insurance.

From this table it is apparent that, apart from the differential in direct and indirect labor costs, the most significant difference between the two mills arises as a result of village expenditures in the southern mill. These costs which contain a substantial labor content are consistently lower for the southern than for the northern mill. This result is to be expected in view of the lower wage scale prevailing in the southern mill. The difference is rather greater, however, than that which might have been expected on a priori grounds. An examination of the individual items which go to make up the group totals does not suggest any one factor as the predominant explanation. Social security taxes are higher per unit for the northern mill. Expenditures for maintenance and repairs and for protection of property have also been higher. Apparently factors other than wage rates have played a significant role, perhaps the relative newness of the equipment in the southern mill.

"Other manufacturing costs" per yard show much smaller differences. This is particularly true in that in the 1938 figures for the southern mill there are included certain expenses previously lumped under "village." An examination of individual items reveals few systematic differences. Supplies and materials have bulked consistently larger in the southern accounts. Depreciation has been a slightly lower charge in the northern mill. Other differences were not consistently significant. Except for the items mentioned, they may safely be neglected.

It appears that the only important differences in standard manufacturing costs per yard are those involved in labor costs, broadly construed, and, as an offsetting item, in village expenditures in the southern mill. The first of these is of much greater importance than the second. Even if village expenditures were absorbed entirely into other costs, there would still be a substantial differential arising largely out of the difference in labor costs per yard of cloth. The increase from 1936 to 1938 in the percentage differential is partly attributable to a greater difference in labor costs, partly to decreased costs for the "village," and partly to other economies effected in and about the southern mill.

Profits.

Comparisons of profit margins between the two mills are more difficult, since recourse can be had only to the accounting "profit per yard" figures.¹⁵ These, as already pointed out, have certain serious limitations, since they cannot be translated directly into real or actual profits. Taken at their face value, however, they indicate that while the profit margin per yard of style "P" is substantially greater in the southern mill, the profit margin per yard for all styles of cloth combined is essentially the same in both mills. There are reasons for believing that the latter comparison is unduly favorable to the northern mill. Nevertheless, the data are probably valid if construed broadly. They suggest some of the reasons for an increasing production of 'style 'P' in the southern mill and a corresponding decrease in the northern mill. They further suggest that by allocating the production of different grades of cloth to the two mills in different proportions the management has been able to approach more closely to maximizing "profits per yard" in both mills.

What differential in profit margins might exist between the two mills if their production were of uniform composition cannot be predicted from the present study. On general a priori grounds, it appears likely that there would be a definite differential in favor of the southern mill. As indicated above, the principal differences between the two mills occur in connection with labor costs, in which the southern mill has a pronounced advantage; this would naturally be reflected in a corresponding differential in profits.

¹⁵ See above, p. 49.

APPENDIX A

TABLE 1.—Average hours and average earnings by 4-week periods, company A

Year and period number	Total number employees	Average pay-hours per employee per period ¹	Average income per employee per period	Year and period number	Total number employees	Average pay-hours per employee per period ¹	Average income per employee per period
1936				1937			
1.....	952	164.0	\$94.54	11.....	1,252	164.7	\$104.28
2.....	1,014	164.9	93.93	12.....	1,238	162.9	104.07
3.....	1,105	177.9	98.68	13.....	1,225	143.5	92.43
4.....	1,152	162.2	89.96	Thrd group average for 5 periods.....			
5.....	1,175	158.5	87.95				
6.....	1,080	157.1	88.31				
7.....	1,037	152.4	87.14				
8.....	1,025	172.0	98.65				
9.....	1,032	177.7	101.45				
10.....	1,076	173.5	99.22				
11.....	1,131	184.4	103.74				
12.....	1,189	190.8	106.02				
First group average for 12 periods.....							

INDUSTRIAL WAGE RATES, LABOR COSTS
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A Series of Case Studies

PART II

THE INTERNATIONAL HARVESTER COMPANY

Prepared by

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Edward S. Mason and Aryness Joy

UNITED STATES DEPARTMENT OF LABOR

BUREAU OF LABOR STATISTICS

Temporary National Economic Committee Studies Section

PART II

PREFACE

This is one of the series of reports on certain of the decision-making processes in individual business firms, prepared by the Bureau of Labor Statistics for the Temporary National Economic Committee. It is designed primarily to answer a number of questions concerning the relation between wage rates, hourly earnings, and labor costs as affected by changes in technology, and the relation between changes in costs and in prices. Some of the questions are:

About wages.—When wage rates are raised or lowered, what happens to hourly earnings and to labor costs? What considerations are uppermost in the minds of executives when changes in wage rates are made? How have changes in technology affected labor costs and what gives impetus to the introduction of new technology?

About costs.—What factors influence changes in costs of particular products—labor costs, cost of materials, and overhead—and how are they related? What systems of calculating costs are used?

About prices.—What are the terms in which prices are quoted? What relation is there between changes in costs and changes in prices for particular products? What do business executives consider when they decide upon changes in the prices at which their products are offered in the market?

The importance of a realistic approach to some of these problems which industry faces can hardly be overemphasized. The course of output, employment, prices, and income in the American economy as a whole is dependent, to an important degree, on executive decisions in the multitude of individual firms that comprise the economy. In formulating governmental policies affecting industry, the mechanisms by which industry functions must be understood. Generalizations about industry's policies regarding prices, wages, or technological changes, for example, must be based on an understanding of the problems facing company officials and the limits within which executive discretion is exercised.

The alternatives open to executives will vary with the financial position of the firm, with the character of the market within which it operates, and with the restrictions inspired by law or custom. Policy decisions themselves will be influenced also by the character of the information available to responsible executives on such subjects as costs, competitive conditions, consumer preferences, and the general business situation. The best approach to a description of the way in which industry makes these decisions appears to be provided by "case studies" of the actual decisions of individual firms. The present study is part of a survey undertaken to test this technique as well as to describe some of the factors affecting business policy decisions in one firm in the agricultural implement industry.

In addition to the study of the International Harvester Co., which is the subject of this volume, studies have been made in two plants belonging to a company in the cotton textile industry, two firms in the paper industry, and two in the manufacture of shoes. This report is illustrative only and attempts to describe the factors influencing decisions relating to prices, wages, technological changes, and plant location. No attempt has been made to assess or to pass judgment upon the policies of the International Harvester Co. The report covers a limited period of time and a limited segment of the activities of the company. Only a few of the many implements manufactured and only one of the 15 plants operated by the company in the United States were made the subject of detailed analysis. The general activities and business policies of the company as a whole are not within the province of this discussion.

In view of the fact that this series of studies is directed toward describing changes in labor costs in relation to total costs and to prices from the point of view of the policies of business firms studied, they have been based in each case almost entirely upon information provided by company officials. Cost, price, and wage data have been assembled from company records, and company policies with regard to wages and prices have been discussed in the course of numerous interviews. If the purpose had been to appraise these policies, rather than merely to describe them, a different procedure would of necessity have been followed.

This study in the International Harvester Co. was carried on throughout with the full cooperation of the executive officials of the company. In addition to the statistical data and cost records which were obtained, the members of the staff interviewed a large number of the officials, including every member of the executive council of the corporation. The description of the policies and operations of the company is based entirely on the information which these officials provided, although the statement of the problems discussed is solely the responsibility of the Bureau of Labor Statistics. The Bureau of Labor Statistics wishes to acknowledge and express its appreciation for the cooperation of all of the officers of the company and their staff and in particular Mr. Harold L. Boyle, economist for the company.

The statistical and descriptive material presented in this report was secured during the summer of 1939 by John T. Dunlop, who spent approximately 2 months in the Chicago offices of the International Harvester Co. and at the Farmall plant in Rock Island, Ill., and by Edward Mason and Edwin M. Martin.

Plans for the study were developed, under the direction of Arnyess Joy, in charge of the Temporary National Economic Committee Studies Section in the Bureau of Labor Statistics, and A. Ford Hinrichs, chief economist of the Bureau of Labor Statistics, by Edward Mason, consultant for these studies, and Edwin M. Martin and John T. Dunlop, of the Bureau of Labor Statistics Temporary National Economic Committee staff. A detailed statement of the original objectives of the study is contained in appendix A. The methods used and their applicability to problems of this character are appraised in appendix A of volume I of this series.

SUMMARY

This study of wages and labor costs and their bearing on total costs and prices in the International Harvester Co. illustrates the nature of industry policy problems which must be analyzed objectively, if industry, Government, and the public are to view their mutual interests in proper perspective. It portrays the variety and complexity of the factors operating in the industrial scene, most of which must be considered separately, in the light of their peculiar setting. A single sizeable company, such as the International Harvester Co., competes in more than one industry and in many markets in which its individual products are sold. The multiple problems of price and of marketing, added to problems of purchasing materials, of labor relations, and of production per se, present complexities through which broad general policies emerge with difficulty. Many policies grow out of day-to-day decisions and become such a part of the fabric of business life that they are taken for granted and rarely are formally expressed. In the International Harvester Co., as in most other large organizations, each important decision is a group decision rather than an individual one, and represents the consensus of a number of executives with somewhat different experience and interests.

In discussing wages, labor costs, prices, and technology in the International Harvester Co., a few specific illustrations have been chosen. Limitations of time made it impracticable to make a comprehensive survey or to appraise the company's policies as a whole. In considering the relation of costs and prices, for example, 13 different types of implements or machines were chosen for special study in the years 1929, 1933, and 1937. In considering wage rates and average hourly earnings, comparisons were made for the same periods at the plants in which these 13 machines and implements were made. This was supplemented by a brief survey of wages and hourly earnings for a much longer period for the company as a whole. Technological changes in manufacturing were studied only in the Farmall works, where tractors are made, and the factors considered in deciding to locate a new plant were illustrated by the new engine works constructed at Indianapolis. Thus, this study is clearly incomplete, even for the International Harvester Co. Moreover, the period studied in greatest detail, 1929-37, is in many respects most exceptional, including, as it does, one of the most severe depressions and the most rapid recoveries in the history of the American economy.

Nevertheless, certain of the observations emerging from the detailed analysis in the following chapters seem capable of fairly general application. It is evident, in the first place, that any consideration of wages, costs, and prices in relation to business policy must be made in the terms which have significance in everyday operations. Thus, in order to appraise the significance of changes in implement prices, it is not enough merely to consider the list price quotation which, in this

case, is called the "dealer's contract price." Many kinds of discounts and allowances—trade, cash, quantity, volume, etc.—must be considered in order to determine either what the company receives or what the dealer must pay. Numerous changes in these collateral terms occurred during the brief period under investigation, and they all had their effect upon price in its broad sense. Thus, in this study, net realizations to the company have been used for the most part to represent prices. The prices paid by the farmer who ultimately buys agricultural implements are also influenced by freight charges, by the dealer's margin, and by such a program as that introduced by the company during 1932 and 1933 of adjusting the price to the market value of certain agricultural commodities, as described in chapter I.

In connection with wages, it has been frequently assumed that an examination of wage rates is adequate for appraisal of workers' earnings or manufacturing labor costs. The records of the International Harvester Co. show that this is by no means true for this company and that both hourly earnings and labor costs are influenced by many factors other than wage rates. For example, hourly earnings did not decline as much between 1930 and 1933 as did wage rates in six of the plants studied, whereas in the other six plants hourly earnings declined more than wage rates. During the recovery period, 1933-37, hourly earnings rose more rapidly than wage rates in all but one of the plants. Over the entire period 1930-37 average hourly earnings advanced more than wage rates in all but one of the 12 plants for which records were examined, in some cases by large percentages. These differences may be attributed to a variety of causes—to the steadier operations accompanying higher levels of output, which made possible higher earnings for piece workers; to increased investment in improved tools; to better organization of production, etc. Nor is the relationship between wage rates and labor costs per unit of output any closer than that between wage rates and hourly earnings. Unit labor costs in general declined less than wage rates during depression and rose less during recovery. Thus, it is clearly inaccurate to identify wage-rate changes with changes in average hourly earnings or in labor costs per unit of output for the International Harvester Co.

In making policy decisions with reference to prices, wage changes, and the introduction of new processes or equipment, the cost of the change is one of the considerations uppermost in the minds of businessmen. In considering the use of cost data, it is important to bear in mind, in general, that cost accounting involves exceedingly complex problems of estimation and allocation, such as the calculation and allocation of depreciation and indirect or "overhead" costs to particular operations. Estimates of prospective costs involve assumptions as to probable volume of future operations. Although such allocations may have no bearing upon total costs of all operations, they will result in a different level of cost for a given operation if made in one way than if they were made in another, thus possibly leading to different decisions by officials in the two instances. Conventional accounting practices which have been developed for certain managerial purposes to which they are well suited are often applied, at least in part, to other kinds of calculations for which they are not equally well adapted. Consequently the particular accounting techniques and conventions which are adopted by any firm exercise a material influence upon the decisions of executives.

In recognition of this fact, the International Harvester Co. has followed the practice of developing three important sets of costs to be used for different purposes. For this reason, much attention has been devoted to an explanation of the methods by which various types of costs are computed in the International Harvester Co., and the purposes for which they are used. In the case of such a large integrated concern, which operates ore and coal mines, ships, and railroads; makes many parts for its own machines; produces a great variety of different products; maintains a widespread system of wholesale branches, etc., problems of cost calculation are necessarily difficult and allocations of cost must be made according to broad accounting principles, of necessity without a high degree of precision in certain cases.

The three important sets of cost data with which this report is concerned are "normal" costs, "specific" costs, and "season's" costs.

"Specific" costs, which are a very close approximation of the economist's concept of marginal costs, are computed for the purpose of determining the comparative advantage of manufacturing a given part or subassembly within the company or purchasing it outside the company.¹

"Normal" costs are computed primarily for the purpose of considering price policy. These calculations are based upon a certain assumed "normal" volume of production (estimated largely from past operations) covering a considerable period of time and designed to average good years with bad. The level at which volume is estimated for calculating normal costs is, of course, crucial, particularly since the prices decided upon will themselves affect volume and therefore influence costs, depending upon the elasticity of demand.

"Season's" costs, on the other hand, are intended to show actual costs for a given season per unit of output of specific machines. Overhead, or "burden" as it is called in this company, is charged to the current year's actual volume of operations. In any large-scale mass-production industry, with high overhead, this necessarily results in season's costs per unit being highest when volume is small, as in a depression year like 1933, and lowest when volume is large and overhead can be spread over more units, as in 1929 or 1937. Consequently, normal costs and not season's costs are used as the primary basis for price policy.

In addition to information regarding costs, a wide variety of other data is available to company executives in their consideration of price policy. Of particular importance is information regarding local market conditions which is regularly supplied to headquarters by its sales organization. Detailed check is kept upon stocks in the hands of dealers in each locality, as an aid, among other purposes, to adjusting manufacturing schedules to reported sales. In addition, executives keep informed on general economic conditions, estimates of farm income, the popularity of competitive machines of varying designs, competitive prices, price and wage trends in related industries, and similar data relevant to the operation and markets of the International Harvester Co.

All this information is, however, merely the raw material from which decisions must be made—made not automatically, but by individual officials. They act on their own responsibility in minor matters and

¹ See appendix to ch. II.

on more important issues, in conference with other officials. In understanding their decisions, it is important to know both the kind of information at their disposal, and their judgments of how their business operates. There seems to be general agreement among the officials of the International Harvester Co. regarding most of the basic premises upon which they act, however different their individual points of view may be on particular matters. Of primary importance to the present discussion is their attitude toward problems of price policy. The executives of the International Harvester Co., like many other businessmen, follow a broad policy of keeping prices stable during a season. It has long been the general practice of the industry and of the company to announce prices once a year, usually in the fall, and, with certain exceptions, to maintain them throughout the selling season.²

Furthermore, it seems to be the general belief that changes in price within what are regarded as practical limits will not influence the sale of agricultural implements to any appreciable degree. This comes largely from the conviction that in periods of wide fluctuations in business, such as the depression period beginning in 1929 and the subsequent recovery, changing volume of agricultural income is the primary factor governing implement sales, rather than the prices at which particular implements are quoted. Consequently, their decisions are based on the conviction that moderate changes in price will not greatly affect volume of sales. In other words, it is assumed that demand for agricultural implements is inelastic.³ This is coupled with the conviction that the same general influences which affect their costs and market situation will affect their competitors in much the same way and that any policy put into effect by one company will usually be paralleled rather closely by other companies. Consequently, it has been the policy of the company to operate on the principle that improvement of quality, service facilities, development of new processes of production, and the creation of improved products and new lower-cost and lower-priced products are the most effective ways of meeting competition, increasing demand, and providing savings for consumers.

It is in the light of these general practices and assumptions that the price policies of the International Harvester Co. should be interpreted. Because of limitations of time, this study has avoided any appraisal of these assumptions or of the general practices and policies of the company. This report seeks merely to describe the situation.

The period 1929 to 1933, when business depression was becoming increasingly acute, offers an excellent illustration of the problem of

² As stated by one of the company executives: "This practice grew out of the desirability of making yearly contracts with dealers for representation and the naming of prices therein and securing initial orders. This is followed by extended periods of manufacture and the spreading of deliveries of products to dealers over a considerable period in advance of the selling season; considerations of fair trade and nondiscrimination between dealers who are reselling to farmers during the same period made midseason price changes inadvisable and if price reductions are made require retroactive readjustments with dealers who have stock on hand previously purchased at higher prices. The whole process of manufacturing a predetermined quantity of machines, contracting and delivering the same to dealers and assisting dealers in disposing of the same is regarded as a unitary project."

³ In the words of the company executives: "When farm prices and income were low during the depression, purchases of consumer goods and necessities naturally came first in the farmer's budget. Farm implements being durable goods lasting many years, most farmers were both able and obliged to defer purchases of new machines until better times, in the meantime buying repairs for their old machines. The company's high sales of repairs and very low sales of new machines bear this out, and many persons can check it with their experience in deferring the purchase of a new auto and repairing the old one. It is our opinion that the company's price reductions made during the depression and the corn, wheat, and cotton plan concessions went as far as was practicable, consistent with a policy of solvency, toward meeting the farmer's purchasing power. However, the gap was too great, most farmers were out of the market, the company was operating at a loss, and further price reductions could only have increased losses."

pricing under severe stress, when demand is declining and many operations are being conducted at a loss throughout the economy. During this period, wholesale prices for a group of representative farm implements and machines, including tractors, reported by all major implement companies to the Bureau of Labor Statistics, showed a decline of 10.5 percent, while dollar volume of sales, as reported to the Census of Manufactures, declined by about 80 percent. The International Harvester Co.'s sales dropped, and prices were reduced in roughly these same proportions. Underlying the International Harvester Co.'s small price reductions during this period, there was the assumption, already referred to, that larger cuts in price would not result in any adequate compensating increases in volume, so that comparative price stability was accepted as the course best calculated to minimize losses during the severe depression. "Normal" costs per unit of output also declined comparatively little, although wage rates were cut, and market prices for materials were somewhat reduced.

On the other hand, during this same period, actual "season's" costs, based upon the number of units then being sold (as distinct from "normal," which assumed a "normal" volume of sales), increased greatly primarily because of the curtailed volume to which overhead was charged. Another factor was inventory losses, which were charged to season's materials costs. Reductions in wage rates were not reflected in equivalent reductions in labor costs for reasons considered in detail in chapter III. In these circumstances, company executives state that they believed it neither feasible nor expedient to reduce prices further.

Undoubtedly, as is evident from the course of prices of many durable goods, a somewhat similar appraisal of the problem of pricing influenced the decisions of many business executives during the years 1929 to 1933. This was particularly true in those industries in which a relatively large share of the output is manufactured by a few companies and where there is an assumption on the part of all producers that a similar appraisal of price problems prevails among other firms in their industry.

Whether the validity of these assumptions as to the probable effect of price cuts on demand has been subjected to adequate tests in the market lies in the realm of debate. It has been suggested by critics of such a price policy that if more prompt price reductions had been made during the early stages of the depression by many producers, covering a wide range of goods, it might have had an important effect in restricting the drastic decline in production and employment which occurred during these years and in yielding somewhat larger returns to manufacturers. From the point of view of the individual producer or even of certain individual industries, it is probable that isolated action with regard to prices would have no extensive effect upon the economy as a whole.

The recovery period 1933 to 1937 is one of considerable contrast. Volume expanded rapidly, particularly in 1935-37, and in the latter year reached levels above those of 1929. "Normal" costs advanced during this period, as wage rates were raised, and as the market prices of materials advanced. "Season's" costs per unit of output, of course, declined as volume increased. In adjusting price policy to these conditions, executives of the International Harvester Co., again acting

upon the same basic assumption that moderate changes in prices would not greatly affect volume of sales, raised prices in order to improve their profit position after the lean years preceding. The price changes were based largely upon general policy considerations rather than solely upon changes in normal costs of production. It would seem therefore, that while business thinking has emphasized costs as the primary factor in price determination, the actual considerations governing price policy are probably related more closely to estimates of the nature of demand and the existing competitive situation than either to normal or season's costs.

In determining wage policy, executives seem to have been largely influenced by the conditions in the general labor market, as well as by the desire to maintain stability of operations and of employment among their own personnel. Between 1931 and 1933 wage rates were twice reduced by the International Harvester Co. as volume declined, and at their low point in 1933 were 23.5 percent lower than in 1929. Increases began in the summer of 1933, and by 1937 wage rates were 52 to 69 percent higher than in 1933 in various plants. Thus, in 1937 wage rates showed a net increase of 16 to 19 percent over 1929 levels. In 1936 and 1937 there were two sets of increases in wage rates, which seemed to have been motivated largely by conditions in the general labor market and particularly by wage advances in other industries requiring similar types of labor, rather than by conditions in the implement industry. There was also a desire to prevent stoppages and to avoid difficulties with union organizations.

It has already been pointed out that labor costs do not fully reflect changes in wage rates. Yet to management, it is the labor cost per unit of output—as well as the total labor bill—which is significant. The importance of direct labor costs depends to a large extent upon the share of the manufacturing process which is performed within the company and the share which represents purchased materials and parts. In the factors entering into the costs of an individual product, the importance of labor costs, as it appears to executives studying cost records, depends upon accounting practices, and in particular, on the way in which labor performed in other plants of an integrated company is allocated in the cost picture—that is, whether as materials or labor. Thus, in the International Harvester Co., the practice of charging as materials all castings, even those made in the foundry of the same plant, necessitated certain special compilations for purposes of this study in order to give greater emphasis to direct labor costs. In general, the cost accounting methods used by the International Harvester Co. as illustrated in the 13 implements and machines considered here, show a tendency to underemphasize the importance of labor and to overemphasize materials, particularly in calculating season's costs.

During periods such as the downswing of 1929–33 and the upswing of 1933–37, changes in labor costs, as in material costs, were much less important in causing changes in season's costs for particular implements, than changes in unit overhead and distribution costs accompanying the rise or fall of production and sales. Total season's costs of producing an individual machine of each of the 13 types studied were actually higher in 1933 than in either 1929 or 1937. With the volume of output that prevailed in 1933, almost no conceivable economies in labor costs or in the purchase of materials

would have converted losses into profits on these individual machines. These unit costs must not be confused with the total cash outlays for the company as a whole, which of course were much smaller in 1933 than in 1929 because of reduced volume; nor with possible economies in the total pay roll, which is of considerable importance in the company's financial position, representing about one-third of total expenditures, on the average.

Numerous and substantial changes in processes, in equipment and machinery, were made throughout the period 1929 to 1937, the most important of which were associated with changes in models. More or less minor changes in technology are constantly being made, as a regular operating matter. In the course of this study records were made available for a considerable number of technical changes made at the Farmall plant, which were decided upon on the basis of the savings they would yield. While these changes were not important in the aggregate, constituting only 5 percent of the total appropriations of improvements, they indicate that there was a tendency to make the new equipment pay for itself within the very short time of 2 years, partly because of the rate of obsolescence on the type of machinery and equipment covered by these appropriations.

Taking the period as a whole, some of these technological changes made savings by replacing labor expenditures (often involving thereby larger material costs and more capital investment), while other changes in technology provided more work for company employees. The net result was to reduce unit labor costs for many of the company's products, but not for all. Although wage rates were higher in 1937 than in 1929, unit costs of factory labor did not increase proportionately to the increase in wage rates on many products over the period 1929-37 because of changes in the processes of manufacture.

The technological changes discussed above were not accompanied, in the case of the Harvester Co., by net displacement of labor. There was an increase in total employment from an average of 47,800 in 1929 to 59,347 in 1937, the recent peak year of operations for the company. In part, this increased employment was made possible by the reduction in average hours of work from 50 hours in 1929 to 40 hours in 1937. It may be attributed also to the fact that the sales of tractors and implements were 15 percent larger in 1937 than in 1929, and that throughout the period the company actively pursued a policy of greater integration, manufacturing more parts in its own plants and purchasing fewer outside.

In conclusion, it is important to emphasize the pervasive importance of volume of operations which runs through this analysis. Clearly it is the key to stability of employment, as well as to profitable operations for the company. It is beyond the scope of this study to say whether price policy, as such, could be used to better advantage in achieving greater stability of operations, but it is clear that the interrelationships of wage rates, technological changes, and labor costs, and of costs and prices, are all highly complex.

CHAPTER I

THE AGRICULTURAL IMPLEMENT INDUSTRY

The manufacture of agricultural implements is one of the oldest of the manufacturing industries whose development in the nineteenth century centered in the United States. The relative scarcity of farm labor and the abundance of good land stimulated the invention of machinery for farming operations. The reaper and the steel mold-board plow were developed in the 1830's, followed in turn by the mower, hay rake, binder, threshing machine, harvester thresher, and various planting machines. With the application of the internal-combustion engine to agriculture, particularly in the form of the tractor, additional farming operations were mechanized and the efficiency of older machines improved.

The first Census of Manufactures reported that in 1849 the agricultural implement industry included 1,333 establishments, employing an average of 7,220 wage earners, to produce \$6,800,000 worth of product. In 1937 the industry¹ ranked twenty-sixth² among manufacturing industries in the number of wage earners employed, provided work in 262 establishments for 77,500 wage earners on the average during the year, disbursed \$122,000,000 in wage payments, and manufactured \$565,000,000 worth of product.³

Average hourly earnings in the agricultural implement industry are above the average for all manufacturing industries, but do not differ significantly from the average for durable goods industries.⁴

¹ According to the Census of Manufactures definition, "the industry embraces establishments engaged primarily in the manufacture of tractors and of machines and appliances, usually operated by horse or other power, for plowing, harrowing, planting, cultivating, harvesting, threshing, and other operations and processes pertaining to agriculture."

² The industry ranked 26th out of 155 industries in the 1937 census listing of those with more than 10,000 wage earners on the average during the year.

³ The following table summarizes the Census of Manufactures reports on the agricultural implement industry for recent census years:

	1933	1935	1937
Establishments.....	194	241	262
Wage earners (average).....	19,264	52,866	77,512
In thousands of dollars:			
Wages.....	18,562	64,321	121,861
Cost of materials, fuel, etc.....	29,006	139,439	286,514
Value of products.....	64,951	291,254	564,778
Value added by manufacture.....	35,945	151,815	278,265

⁴ The following table gives the average hourly earnings for these 3 classifications and for the 2 main activities of the International Harvester Co. for the years 1935 to 1937:

[Average hourly earnings in cents per hour]

	1935	1936	1937
International Harvester truck and tractor plants ¹	0.716	0.747	0.870
International Harvester implement plants ¹.....	.620	.649	.757
All agricultural implement plants (including tractors) ².....	.592	.610	.716
Durable goods ².....	.607	.620	.704
All manufacturing ².....	.568	.575	.643

¹ Source: International Harvester Co.

² Source: U. S. Bureau of Labor Statistics.

Concerns in the industry can be divided roughly into "long line" companies that produce a relatively full complement of implements and machines and "short line" firms that concentrate on a limited range of products. A "short line" company, for instance, might make only plows and other tillage implements, or harvesting machinery, or tractors. While it is difficult to classify some firms, there are at least eight main "long line" companies. The number of "short line" concerns depends on the inclusiveness of the definition adopted for the agricultural implement industry.

Concerns that are usually classified in the agricultural implement industry frequently engage in other lines of production, as, for instance, the manufacture of motor trucks, industrial tractors, and binder twine. Firms ordinarily regarded as in other industries, however, may be important producers of agricultural machinery. For example, the Ford Motor Co. and Sears, Roebuck are both in the farm tractor and implement business.

International Harvester Co.

The International Harvester Co. was formed by the consolidation of the 5 largest competing manufacturers of harvesting machines in 1902. The company's production at the outset was almost entirely confined to harvesting machines—grain binders, corn binders, mowers, and rakes; it made approximately 80 percent of the mowers and 90 percent of the grain binders produced in this country. This "short line" of harvesting equipment had been expanded by 1938 to a "full line" of 95 major machines, classified as motor trucks, farm tractors, plows, tillage implements, planting and seeding machines, haying machines, grain harvesting machines, corn harvesting machines, general farm equipment, dairy equipment, and industrial power units, with 1,700 separate machines, exclusive of attachments and parts.

INTERNATIONAL HARVESTER COMPANY PLANTS

IN THE UNITED STATES

1938



A general picture of the International Harvester Co. is provided by the following statistics: In 1938 the company operated 15 implement, tractor and motor truck plants and 2 twine manufacturing plants in the United States, most of them in the midwestern States. The location of these plants is shown on the map. In addition, the company operated iron mines in Minnesota and coal mines in Kentucky, 2 ore boats on the Great Lakes, 2 small railroads, and a steel mill in the Chicago area. Its foreign business is handled in part by exports from the United States; in part by the 6 implement, 1 motor-truck, and 4 twine manufacturing plants in Canada, Europe, and Australia.

The International Harvester Co.'s line of products in the United States is distributed by branch houses, transfer houses, and motor-truck sales and service stations located, in 1938, in 158 cities. Retail distribution is handled primarily by dealers who have signed contracts with the company, of whom there were about 11,000 in 1938. In addition, the company itself owned or controlled 108 retail stores. During 1938 the company had an average of 47,106 employees on its pay rolls in the United States, compared to 59,347 in the peak year of 1937 and 47,800 in 1929.⁵

In 1938 there were outstanding 816,724 shares of preferred stock and 4,245,736 of common stock held by approximately 34,000 stockholders. In 1936, 9 individuals owned 37.9 percent of the common stock and 20 percent of the preferred stock. The Federal Trade Commission in its report on the International Harvester Co. indicated an average rate of return of 8.76 percent on the total investment of the company, both foreign and domestic, in the 10-year period 1927-1936.⁶ This rate of return was calculated before deducting Federal income taxes; if Federal income taxes are deducted from these figures, the average rate of return becomes 7.29 percent. The International Harvester Co., using a different basis of calculation, reports an average annual net profit of 6.62 percent on its total investment for this 10-year period and a rate of 6.9 percent for the 36-year period since its organization.⁷

The International Harvester Co. occupies an outstanding position in the agricultural implement industry throughout the world. Although any precise measure of its position, like that of any other company, is difficult to make—depending on the definition of the boundaries of the “industry,” the use of uniform methods of reporting value of assets or sales by all companies, and a complete coverage of the firms included within the industry—there is no question of its leading position in providing farm implements and machines. On the basis of figures on the sales of the International Harvester Co. in 1938 and those of all agricultural implement companies as compiled by the Bureau of the Census, it would appear that the International Harvester Co. was responsible in that year for between 30 and 35 percent of the total domestic sales of farm implements.

⁵ These figures include employees in motortruck and binder twine plants and in branch houses, as well as those engaged in manufacturing agricultural implements. They are not comparable with the figures given in footnote 3, p. 72, which refer to wage earners in the agricultural implement industry only.

⁶ The Report of the Federal Trade Commission on “The Agricultural Implement Industry,” op. cit. pp. 425 and 443.

⁷ The Company makes a different disposition of certain reserve and other accounts.

This over-all figure conceals wide variations in the importance of the International Harvester Co. in the market for particular implements and machines. For instance, the company sells more than half the corn binders, grain binders, and mowers sold in this country, while its sales of some types of plows are less than 5 percent of the United States total. The extent of this variation is indicated by the following table which compares the sales of each of 64 types of machines made by the Harvester Co. in 1938 with the total sales of these machines in that year as compiled by the Bureau of the Census.⁸

TABLE I.—*International Harvester Co.'s percentage of 1938 trade in 64 types of farm machines*

[Based on number of machines sold]

Percent of total sold by International Harvester Co.:	Number of machines	Percent of total sold by International Harvester Co.:	Number of machines
Less than 10.....	6	50 to 60	3
10 to 20.....	12	60 to 64.....	2
20 to 30.....	18		
30 to 40.....	17	Total.....	64
40 to 50.....	6		

Source: International Harvester Co.

Furthermore, the relative position of any one of the concerns in the industry with reference to its share of total sales of particular farm machines has in many cases varied greatly from year to year. This may be illustrated by an account of the changing proportion of tractor production for which the International Harvester Co. has been responsible over the past 15 years. In round figures, the Harvester Co. sold 23 percent of the wheel tractors sold in the United States in 1925, 33 percent in 1927, 60 percent in 1929, and 42 percent in 1938. Ford held a dominant position in the early 1920's, but later discontinued production and was replaced as the leading producer by the International Harvester Co., which introduced the Farmall tractor in 1925. Thereafter the "long line" companies all developed new model tractors. By 1935 the small tractor of the Allis-Chalmers Co. was a leading competitor. In 1939 the Ford Motor Co. reentered the field at the same time that new models were being brought out by the International Harvester Co. and other companies. The same history can be paralleled, with variations, for other machines, such as the small combine or harvester thresher, corn picker, etc. The introduction of new models has in many instances resulted in material changes in the distribution of sales among the competing concerns.

The effect of the introduction of tractors and trucks upon the character of competition in the industry, as well as the price structure, has been great. For many years the implements produced by the industry were horse-drawn. With the gradual introduction of the tractor many of the same implements were pulled behind the tractor, rather than being especially redesigned. This was in large part due to the fact that farmers already owned their implements and preferred to use them behind a tractor rather than to purchase a whole new set of equipment. As horse-drawn equipment wears out, it is being

⁸ Sales of only 64 types of machines are compared here, although the company produces some 95 types. The difference is due to the exclusion from this compilation of motortrucks and industrial power units, and to some differences between the classification of machines as followed by the Census Bureau and that followed by the Harvester Co.

replaced by implements especially designed for the tractor. This development is probably strengthening the position of those companies in the industry which make tractors, as well as other implements, as against those companies which make only a limited line of implements. With this development of equipment especially suitable for use with the tractor, there has been a marked decline in the volume of production of horse-drawn implements.⁹

Organization of the Company.

The board of directors of the International Harvester Co. is composed of 18 members, 5 of whom are officers of the corporation and 4 of whom are members of the McCormick family. The officers of the corporation, with offices in Chicago, consist of a president, a first vice president, a second vice president (in charge of manufacturing), a vice president and general counsel, treasurer, secretary, comptroller, and 5 vice presidents in charge, respectively, of United States and Canadian sales, foreign sales, purchases, engineering, and Wisconsin steel works and coal and iron mines. It is this group of officers that is directly responsible for making decisions and formulating policies. With some other executives they meet twice a week as the executive council.

Each manufacturing plant is under the immediate direction of a superintendent, responsible to the works manager, who in turn is responsible to the manager in charge of manufacturing, who is responsible to the vice president in charge of manufacturing. Similarly, the works auditor at each plant reports directly to, and receives orders from, several general works auditors, the assistant comptroller in charge of manufacturing accounts, and the comptroller. In this way decisions affecting manufacturing and accounting practices and records are centralized in the Chicago office and coordinated for all the company's plants.

The sales department is similarly organized with five district sales managers reporting to a domestic sales manager and assistants, who report to a director of sales for the United States and Canada, who in turn is under the supervision of a vice president. These district sales managers are responsible for the branch houses and dealers in their territory. In addition to this geographical division of sales responsibility, there are sales managers responsible for certain lines of products, who cover the whole country.

The product engineering and research activities of the corporation in the United States are concentrated in the engineering department which in turn is subdivided into the gas-power division, the implement division, and the motortruck division. While engineering departments are maintained at all works, the principal research of the gas-power division is done at the tractor works in Chicago, that for

⁹ Compare, for instance, the changes between 1929 and 1937 in the number of tractor plows and horse cultivators sold by all firms in the industry:

	1929	1937
Tractor plow.....	90,931	140,372
Cultivator, horse-drawn.....	358,332	180,828

implements at the McCormick, East Moline, and Canton works, and for motor-trucks at the Fort Wayne works. After implements and machines have been perfected in these engineering departments, they are put to field tests under actual conditions in many parts of the United States. It is the practice of the company to experiment with its various new machines and improvements first each season in the Imperial Valley, moving east and north through the United States and Canada with this equipment as the season develops.

Against this background of company organization, there are some special features of the marketing practices of the industry and the company which are important to an understanding of the company's policies.

International Harvester Co. Dealer Contracts and Prices.

With the exception of the mail-order houses, most sales of implements are made through local dealers who have contracts with manufacturers. The International Harvester Co. enters into contracts with its dealers during October and November of each year. Dealer contracts provide for the price to the dealer and for cash and volume discounts and the various other provisions in the terms of sale. The company states that, while no retail price is prescribed by the company, its dealers are told the retail price that will be quoted if a buyer goes directly to an International Harvester Co. branch house, or to one of its retail stores. In general, prices are set once a year, and ordinarily do not change during the "season." It is agreed in the contract, however, that subsequent price reductions will be made retroactive on goods already in the hands of dealers which have not as yet been sold to customers. Price increases in the course of the "season" are not applied to dealers' unsold machines on hand, but are applicable to machines ordered after the effective date of the price increase.

This customary pricing of implements and equipment once a year is an important characteristic of the whole agricultural implement industry. As a result, the period of a year is in general the planning period for the industry. Price and production schedules are made up before the season starts, and a decision which is made in September or October of one year frequently is still in effect through October of the following year. This imposes difficulties on the process of forecasting both demand and costs. These difficulties in determining production quotas for individual implements are particularly serious because of the method of scheduling production. In the International Harvester Co. only a few leading items, such as tractors, are under production throughout the year. With these exceptions, plant facilities are devoted to the manufacture of particular implements for only short periods of time; they are then utilized, again for limited periods, for other implements, and so on throughout the year. In this way the many items comprising the company's line are produced consecutively and not continuously. This is done to utilize the economies of specialization and also to spread production as evenly as possible throughout the year. The operations of the International Harvester Co. were highly seasonal in character during its early days, with factories shutting down entirely during part of the year. Certain "short line" companies still display this characteristic. However, the system now in use renders production estimates particularly critical for those implements which are fabricated during limited

intervals only, since the entire season's requirements are filled within a few weeks and adjustments to meet changing market conditions are necessarily difficult.

This year-round production policy also presents difficulties of storage, since machines are produced considerably in advance of sale.¹⁰ The International Harvester Co., like most other long-line firms in the industry, carries a very substantial inventory, compared to firms in other fields of manufacturing. For instance, in the company's fiscal years ending December 31, 1929, and October 31, 1937, the balance sheets show:

	1929	1937
Cash.....	\$23, 478, 016. 82	\$34, 237, 893. 46
Receivables, less reserve for loss.....	137, 325, 297. 03	118, 499, 725. 74
Marketable securities.....	2, 406, 286. 69	613, 512. 37
Inventories.....	102, 295, 187. 73	155, 915, 690. 09
Total current assets.....	265, 504, 788. 27	309, 266, 821. 66
Total assets.....	384, 078, 321. 99	427, 073, 942. 85

Current assets were 69.1 percent of total assets in 1929 and 72.4 percent in 1937; inventories were 26.6 percent of total assets in 1929 and 36.5 percent in 1937. Of course, this is due in good part to the fact that the company, since it distributes through branch houses, performs the wholesaling as well as the manufacturing function and wholesaling necessarily requires sizeable inventories. There are, however, several added reasons peculiar to the agricultural implement industry for these large inventories. First, the farmer requires repair parts and equipment "on the spot." It would mean considerable loss to a farmer if he were unable to make a repair on an implement in the midst of a farm operation, such as plowing or harvesting. This means that repair parts cannot be kept at a single central depository, but must be scattered throughout the country in branch houses and with dealers. It means much to the farmer and, therefore, much in the farmer's loyalty to a manufacturer to be able to replace immediately a whole machine or a part of it in the midst of his operations. Second, since agricultural implements have been notably long-lived, inventories must be kept on the parts of old models. Farmers use implements that are 20 or 30 years old, and it is the policy of the company to keep repair parts on all models in stock. Third, there is a large number of models because each type of machine is multiplied by such adjustments as are necessary to meet the wide variety of soils and climatic conditions in which agricultural machinery is used. In each type of soil and crop, modifications have been made to satisfy the needs of farmers more adequately. This multiplication of types and models increases materially the size of inventories which must be kept.

Since production schedules must be determined considerably in advance of sales, the International Harvester Co. and other implement companies have frequently been caught with large inventories as a result of a sudden falling off in demand. Inventories that are not excessive with a high volume of business become serious with a marked

¹⁰ It was partly to meet this difficulty that the "vendor's option" discount was introduced. It provided that a dealer would receive a discount of 2 percent if he took delivery on his order at the convenience of the company before a specific date, which would vary with area and machine. (See ch. II, p. 95, for a fuller discussion.)

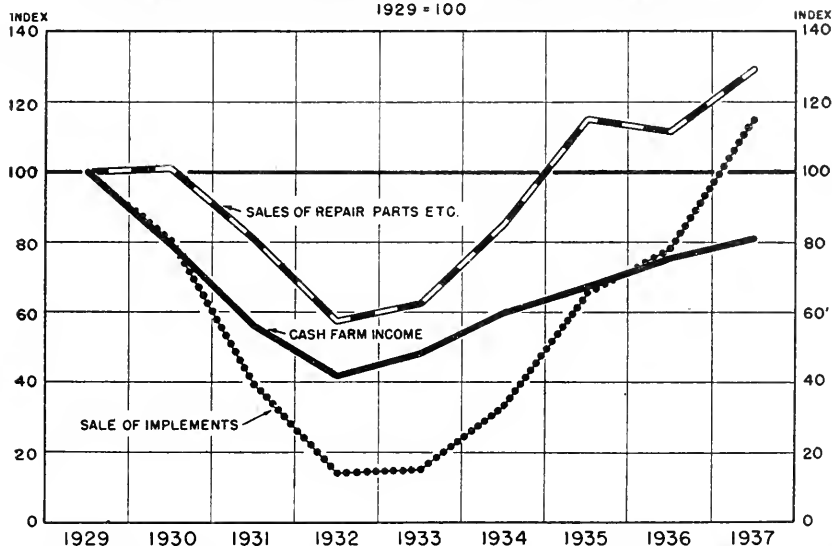
falling off in sales. This is an important consideration in planning the company's program for the year.

The decisions of executives of the International Harvester Co. are also influenced by certain characteristics inherent in their product. Agricultural implements are durable capital goods, used primarily by farmers, to produce consumers' goods and raw materials for other industries. As with other durable capital goods, the production and

Chart I.

SALES OF AGRICULTURAL IMPLEMENTS AND REPAIR PARTS BY INTERNATIONAL HARVESTER CO. AND CASH FARM INCOME

1929 = 100



U. S. BUREAU OF LABOR STATISTICS

SOURCE: INTERNATIONAL HARVESTER CO. AND BUREAU OF AGRICULTURAL ECONOMICS

sale of agricultural implements has fluctuated widely during periods when their prices were changing relatively little. Changes in the incomes of farmers have been accompanied by much more than proportional variations in the sale of agricultural implements, as may be seen in chart I which shows fluctuations in cash farm income, and in the sales of tractors and implements, and of repair parts by the International Harvester Co. since 1929.¹¹

¹¹ For data on which this chart is based, see appendix B.

CHAPTER II

PRICE DETERMINATION AND PRICE POLICY

THE PRICE STRUCTURE

The structure of prices for a concern such as the International Harvester Co. is highly complex. The corporation in 1938 made 95 different kinds of major implements and machines and many sizes and models of each. Consequently prices had to be set for more than 1,700 individual products. There are tens of thousands of separate parts which must be kept in stock for the purpose of repair or replacement, many of these for obsolete models, for each of which a price must also be set.

For each individual product marketed, there is not merely a single price but an entire price structure. There is a variety of discounts and terms of credit as well as other collateral conditions of sale which vary for different kinds of buyers and different sizes of order, and which correspondingly multiply the problems of price policy.¹ However, this does not mean that the company must constantly make new decisions with regard to each of its prices and terms. In common with most companies in the industry and with other industrial concerns similarly situated, its price structure has been built up over many decades and its general aspects are well known to farmers and to the trade. Consideration of prices for most items accordingly centers around changes from established levels. A decision not to change a quoted price in some circumstances where the market situation has changed radically may be as significant a decision as one in which an important price change is made. Only in those instances where a complete new line, such as a new tractor, is introduced, is it necessary to consider the price of an implement *de novo*. The following discussion is of the considerations involved in making changes in the prices of established lines, rather than of the much more complex issues raised when a completely new line is introduced.

In general, few agricultural implements are sold directly to the ultimate user. The great bulk of the company's product is distributed at wholesale through dealers. For each item there is a wholesale listed price, also called the "dealer's contract price," which is quoted f. o. b. Chicago or factory, whichever is less. This dealer's price is modified by various kinds of discounts and allowances. The price actually paid by the dealer is therefore the dealer's price, plus freight from Chicago or plant, and less the discounts or allowances applicable. The net realization to the company is the amount actually paid by the dealer before the addition of freight.

Prices may be modified either by a change in the dealer's price as such or by a revision of the collateral terms of sale. Although changes in dealer's prices or in terms of sale may be induced by somewhat

¹ Discounts and other terms of sale are described in detail below, p. 93 ff.

different considerations, it is necessary to examine both in order to understand the behavior of prices. As far as the ultimate user is concerned, the price to him is affected also by the spread or margin between the amount paid by the dealer and the retail price, as well as by the trade-in allowance granted by the dealer on used equipment.² Although these factors would be important in a consideration of the effect of price movements upon the consumer, they will not be treated in the following discussion, which is concerned specifically with prices at the wholesale level.

The prices of agricultural implements in general, and of the International Harvester Co. in particular, are of the class of prices which can be influenced by the administrative policy decisions of business executives. Many of the factors influencing price are, of course, largely outside the control of the company, such as raw-material prices, competitive conditions, and the purchasing power of its customers. Such considerations, however, do not of themselves require the setting of prices at some specific point, but rather establish in the long run practical limits within which administrative discretion is exercised. It is the manner in which this discretion is exercised that constitutes the problem of corporate price policy.

RESPONSIBILITY FOR PRICE POLICY

In common with most very large concerns, there is no single official of the company charged with sole responsibility for deciding upon price changes or upon price policy generally. In the case of the International Harvester Co., such decisions are made in conferences attended by the executive officials and representatives of various major departments of the company—sales, accounting, engineering, and manufacture.³ These conferences usually decide upon the changes to be made in the prices of a few typical implements; the prices of the full line of machines are then fixed by the sales department in accordance with certain dollar differentials between the typical machine and other similar machines.⁴

Although all these officials have a common attitude toward most of the company's problems they represent to some extent differing points of view, based in the case of departmental officials upon the specific interests of their departments. For example, the representative of the sales department is most likely to favor price reductions as a means of expanding sales, while the comptroller may urge the need of maintaining a satisfactory "trading profit", that is, an adequate margin between net realization to the company and cost of the products. At the same time, the representative of the sales department, despite his preference for somewhat lower prices, may

² The extent of trade-ins is revealed by a study made by the International Harvester Co. covering the period November 1, 1937, to October 18, 1938, from the records of 56 representative dealers. These dealers sold a total of 8,836 machines of various kinds. Trade-ins were taken on 5,050 of these machines or 57 percent of the total. Trade-ins occurred most frequently in sales of tractor-drawn or mounted equipment and sales of large units, such as harvester threshers and tractors. A large number of the 3,786 machines sold without trade-ins were rather small implements. The study showed that of the 1,289 tractors sold during the period, 82.9 percent involved a trade-in, and that for 75.2 percent of the tractors sold, the trade-in was another tractor. The trade-in allowance complicates the interpretation of retail price. Variations in the liberality of trade-in allowances may conceal important fluctuations in the effective retail price.

³ The specific officials of the International Harvester Co. who take part at various stages in pricing decisions are the president, first vice president, second vice president in charge of manufacturing, vice president in charge of engineering, vice president and general counsel, vice president in charge of sales, treasurer, and comptroller. All of these officials have been associated with the International Harvester Co. for many years.

⁴ Changes in these differentials are also made in most cases by the sales department.

also advocate changes in the product with a view to enhancing its sales appeal—changes which may entail added costs. Other officials may at times urge other specific viewpoints; thus the general counsel is necessarily concerned with insuring that the price structure conform to the legal requirements of such legislation as the Robinson-Patman Act.

In spite of these minor differences arising from the specific orientation of their respective departments, there is general agreement among these responsible officials regarding the general lines of company price policy. One of the most important points in regard to which opinion seems to be in accord is the effect of price changes upon sales. There seems to be general agreement among the officials in charge of price policy that the demand for agricultural implements is inelastic. This is in contrast with the elastic demand for certain consumers' goods such as household equipment. Farm income is considered to be the most important factor determining the volume of sales. A comparison of farm income with implement sales and sales of repair parts is shown in chart I, p. 79. This chart is used by company officials to make the point that when farm income drops there is a tendency to defer new implement purchases and repair old equipment; when farm income rises, worn-out implements tend to be replaced with new ones instead of being repaired. Officials believe that these relationships would not be appreciably altered by the adoption of different price policies; that is, that the number of agricultural implements sold would be little affected by further price changes within what are thought of as practicable limits.⁵

This judgment applies, of course, to the sales of the industry taken as a whole. It is agreed that the sales of the International Harvester Co. alone may be reduced if a competitor should cut his price materially. At the same time it is recognized that there are many factors other than price which may influence the buyer in his purchase of agricultural implements from a particular company. Consequently there is a general belief that, within certain limits, prices may be set above or below those of other companies without substantially altering the share of the total market which the company obtains. These limits are different for different machines. The extent to which the price of an International Harvester machine can, for example, be above the prices charged by the rest of the industry without affecting its share of the market is determined by such factors as the prestige of the company among farmers and of the particular machine in comparison with competitors' models, the service facilities provided, and the trade-in and credit terms given by dealers.⁶ This is not considered

⁵ An interesting illustration is provided by the discussion which preceded the fixing of the price at which the new tractor model, recently introduced, was to be sold. A new range of prices was selected, which approximated the price range of competing tractors, and a tractor designed to sell for this prospective price. Originally a price of \$495 had been anticipated but costs seemed to dictate a higher price, eventually set at \$515. When asked which price would have yielded a larger volume of sales, the sales representative replied that he thought the lower price would have given a slightly larger volume of sales. This view was held primarily because of the psychological effect of the price being below \$500. This estimate of the elasticity of demand was held by only one out of all the officials of the company.

This appraisal of the elasticity of the demand for agricultural implements is presented merely as the consensus of the company's officials and implies no judgment by the Bureau as to its validity. It has been suggested in another report prepared by the Bureau of Labor Statistics for the Temporary National Economic Committee that there may be some tendency among businessmen to underestimate the degree to which sales can be stimulated by price reductions. For a discussion of this point see monograph I, Price Behavior and Business Policy, chapter II.

⁶ See monograph I, Price Behavior and Business Policy, for a discussion of the nature and importance of this type of situation.

to be a pressing problem, however, since most general price changes are made with the belief that similar changes in demand or in costs will be felt by all concerns in the industry alike, and that, in terms of prices, the reaction of executives of all companies will be along similar lines. Since all companies endeavor to keep informed of each other's published prices, there is opportunity for prompt adjustment if any price is out of line with that prevailing elsewhere in the industry.⁷ Since there is such relative unanimity of opinion about the inelasticity of demand, there has been little tendency to risk incurring the losses which they believe would be involved in any attempt to test it by considerable price changes.

The views of officials with respect to price are also influenced by a general desire to avoid price policies which may lead to protest by farmers and by various governmental agencies. It is feared that the good will of the company may suffer through price increases in certain cases, or the failure to reduce prices at certain times, even though its sales may not be immediately affected.

Specific decisions as to price policy are, of course, based upon the analysis and interpretation of various kinds of factual information. Calculations of production costs under various conditions—actual operating conditions and forecasts of future operations—are deemed of major importance. Information regarding competitive conditions is available from the price lists published by competing companies, as well as from dealers and sales representatives of the company. The sales organization, extending from dealers through blockmen,⁸ branch houses, and sales managers, is in a position to report promptly any competitive advantage gained by a rival who is quoting low prices, offering special guarantees, or introducing a new model. Information of this sort is systematically collected. In September and October of each year estimates of the number of each principal type of machine that can be sold in the coming season are made by this sales organization. Preliminary estimates are made by blockmen after discussions with dealers, and these are gone over carefully by all the sales officials up through the vice president in charge of United States and Canadian sales. In addition, blockmen obtain weekly reports from dealers regarding their inventories of heavy lines of machines such as motor-trucks, tractors, and combines, and four times a year reports on inventories of all machines and implements are collected. From these reports estimates of sales to users are made by the company.

Since the policy of the company does not involve day-to-day price adjustments but is rather, for reasons discussed subsequently, aimed at maintaining stable prices for the selling season, which may be as long as a year, information regarding the probable trend of the general economy is relevant. The information of this character which is given

⁷ This tendency of competing agricultural implement firms to make their own price policies in the light of the probable reactions of their rivals is, of course, characteristic and probably inevitable for most industries in which the bulk of the business is done by a small number of large companies. There is a very considerable body of economic literature discussing the implications of this type of situation upon the behavior of prices. The conclusion generally reached is that under this form of "imperfect" competition prices tend to be higher than in an industry in which the number of independent competing sellers is too great to make it possible for the individual concern to take account of the probable reactions of their competitors in determining their own price policies. (See, for example, Edward H. Chamberlin, *The Theory of Monopolistic Competition*, Harvard University Press, 3d edition, 1938; Joan Robinson, *The Economics of Imperfect Competition*, MacMillan, 1933; Loyde Alexander Morrison, Ph. D. Dissertation, University of California, 1928, *Costs and Prices Under Conditions of Competition and Monopoly*.) On the other hand, there are certain economies of mass production, which cannot be achieved except by relatively large concerns, and which have made possible lower costs and prices.

⁸ A blockman is an employee of the company, under the direction of the branch manager, in charge of sales to dealers and supervision of dealers' accounts in a subdivision of the territory allotted to a branch house.

most attention by company officials is the series of reports on crop and business conditions made weekly by each branch house and monthly by each branch-house manager, collection manager, and district sales manager. In addition to this information secured from the company's own organization, Government statistical series, including national income, farm cash income, prices of basic materials and farm products, cost-of-living and employment-office records appear to hold particular interest for the executives. Also available are reports of numerous private statistical and forecasting services and research bureaus, and the statements of banks, financial institutions, and published annual reports of competing firms.

In actual deliberations leading to decisions as to prices, the thinking of executives begins with a consideration of costs, primarily "normal costs," as described below.⁹ The prices of competitive machines and the comparative merit and favor of their designs are then considered. General business conditions, particularly the prospective demand of farmers for implements, are also given consideration. The necessity of retaining the good will of farmers is always kept in mind. There are certain other aspects of company policy which may minimize the usual cost considerations for particular machines. The company has derived both prestige and profit from maintaining practically a full line of agricultural implements and trucks; this prestige would be impaired if it did not market all the important lines of equipment. In periods of depression the price of certain items has been below normal factory and selling costs.

In summary, the decisions of the company officials responsible for its price policy are predicated upon the assumption that moderate changes in price will not affect sales greatly, and are based upon the consideration of a wide variety of factors, of which cost is but one. The actual decisions made are of two general kinds; those involving variations in the level of prices of all machines and those affecting only particular machines. In either case, the decision may be conceived as comprising three steps—whether prices are to be changed or not, the amount of change, and the precise manner and mechanics of change.

In many ways the first of these decisions is the most important since the International Harvester Co., like most business firms, prefers to avoid frequent changes in prices.¹⁰ It is usually possible for a competitor to match a price change promptly. It is not surprising, therefore, that there would be a disposition to avoid price changes unless there is considerable probability that they will be profitable or will yield the company some important competitive advantages. It is an established tradition of the agricultural implement industry to announce prices only once a season and generally to maintain them throughout the season. Midseason changes in price in either direction, although not unknown, are infrequent and involve expense—in making refunds to dealers who bought at higher prices (when prices are cut), in issuing new price lists, in notifying dealers, and in changing advertising. Even more importantly, price cuts unfavorably influence dealers' relations, enabling the customer's neighbors to buy similar machines at lower prices while he is still paying for his more expensive

⁹ See p. 100 for a discussion of normal costs.

¹⁰ See monograph I, ch. III, for a discussion of this tendency throughout industry.

machine. The introduction of a new model or an improvement in quality will usually yield a longer and more substantial competitive advantage, according to company officials, than a cut in price.¹¹ The structure of the industry, particularly the relatively small number of firms, makes it possible to express this preference in an effective policy.¹²

It may be said of this company, as of other large companies similarly situated in other industries, that there is seldom a thorough examination of general price policy, in the sense of a reappraisal of the entire price structure, except when costs or market conditions are changing very radically, as in years of severe depression or rapid recovery. Decisions as to general policy with respect to particular machines are called for when new models of machines are being introduced. With the exception of such circumstances, price policy decisions usually relate to price adjustments for specific purposes in terms of the cost and market conditions immediately involved.

Once it has been decided that a particular price or the entire price structure requires adjustment either upward or downward, it then becomes necessary to decide the precise extent of the change, and finally the manner in which it is to be accomplished. It has been pointed out that net realizations of the company can be altered both by changing the list price and by altering collateral terms of sale such as discounts. The amount of change which can be accomplished by adjusting discounts or terms of sale is obviously limited. Moreover, changes in the discount structure may affect the company's relationships with its distributors. Legal considerations, such as the requirements of the Robinson-Patman Act, also set practical limits to the extent of the changes in price which can be accomplished by altering collateral terms of sale. Changes of this kind are described below (pp. 93 ff).

PRICE CHANGES DURING DOWNSWING—1929-31

Since 1929 there have been a series of rapid and violent changes in commodity prices and in the national income. These major up-swings and downswings have affected the cost of production and demand for the products of all industries, including the agricultural implement industry. The manner in which industrial price policies have been adjusted to these violently changing conditions has been a subject of much controversy.¹³ Since demand and cost changes of this magnitude are considered by the responsible executives of the International Harvester Co. to call for careful consideration of their general price policy, the price history of the company during this period is of especial interest.

The accompanying chart II shows the movement of wholesale prices of agricultural implements between 1913 and 1939, as measured by the prices of a representative list of 40 implements and machines reported by a number of manufacturers to the Bureau of Labor

¹¹ *Ibid.*

¹² According to the Federal Trade Commission, the domestic sales of the 10 largest manufacturers and sellers reporting to the Commission represented a little less than 89 percent of total value of all farm implements sold for use in the United States, as reported by the Bureau of the Census for the year 1936. On the other hand only a little more than 11 percent of the total sales were left for the large number of smaller manufacturers of farm implements and machines. (Federal Trade Commission Report on the Agricultural implement and Machinery Industry, 75th Cong., 3d sess., H. Doc. No. 702, p. 14.)

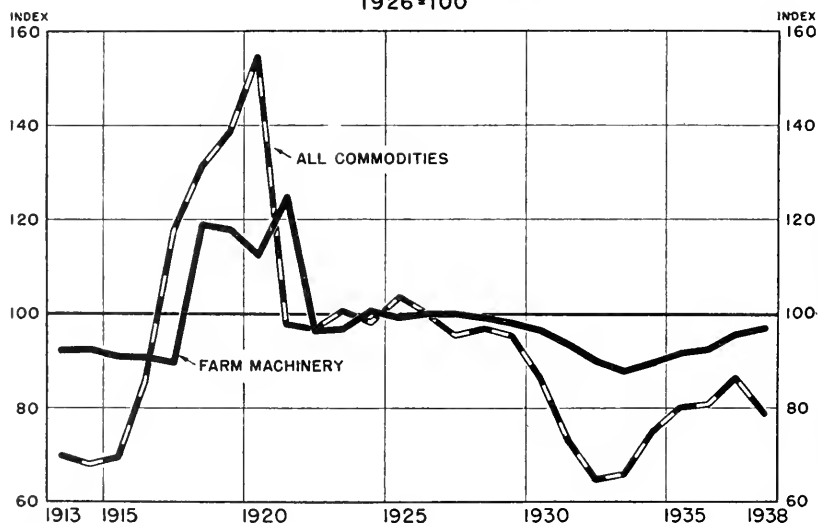
¹³ See Monograph I, ch. II.

Statistics.¹⁴ From 1929 to 1933 implement prices on the average declined by 10.5 percent, compared with a decline of 30.8 percent for the Bureau's composite index of all wholesale commodity prices including prices of farm and food products. Prices received by farmers for their products declined by 52.1 percent during this period.¹⁵ In contrast to the relative steadiness of implement prices, the total value of implements produced for domestic sale declined about 80 percent from 1929 to 1933 (the physical volume, of course, declined somewhat less), while the physical volume of agricultural production fell by only 4 percent.¹⁶ It is difficult to obtain prices for any other group of machines manufactured under conditions similar to those in the agricultural implement industry, but it is generally true that prices and production of steel, automobiles, machinery, and certain other durable goods followed the same general pattern during the depression; that is, production declined greatly, while prices fell but little.

Chart II.

WHOLESALE PRICES OF FARM MACHINERY

1926=100



U. S. BUREAU OF LABOR STATISTICS

The figures quoted on agricultural implement prices do not fully reflect all changes in discounts and special allowances, or the effect on prices of the so-called "crop guarantee plan" which was instituted by the International Harvester Co. during the depression. A description of this plan and of the changes made in the discount structure are given below.¹⁷

¹⁴ For data for chart II., see appendix B.

¹⁵ "Index Numbers of Prices Received by Farmers for Farm Products" (Revised 1934), Bureau of Agricultural Economics, U. S. Department of Agriculture.

¹⁶ "Agriculture Production in 1934", Bureau of Agricultural Economics, U. S. Department of Agriculture.

¹⁷ See pp. 93 ff.

One explanation advanced by company officials for the comparative stability of prices during the downswing is the relative inflexibility of their costs. Two sets of costs are important. Normal costs are computed for the purpose of assisting in price-policy determination, and are based upon an estimated normal volume of production which averages good years with bad. Their present method of calculation is described in detail below.¹⁸ On the other hand total "season's" costs per unit of output, reflecting actual costs on the current volume of operations,¹⁹ rose materially during the period 1929-33 because overhead had to be spread over a much reduced volume of production. In the recovery period, 1933-37, these costs were reduced as volume expanded. Because of this sensitivity of total season's costs to changes in volume, they are not considered as guides to price policy by the company.

Unfortunately, normal costs were not calculated before 1932 on a comparable basis, and have since that year been calculated at irregular intervals. It is therefore impossible to compare their trend with changes in prices during the period 1929-37 as a whole. Changes in season's labor and material costs, excluding overhead, have accordingly been utilized in the following discussion, since they were the principal series of cost figures available continuously throughout the period that were relatively unaffected by changes in the volume of production.

SEASON'S COSTS AND PRICES, 1929-33

Between 1929 and 1933, although wage rates were reduced by 18.1 percent and direct labor costs per unit of product fell somewhat, season's material costs as calculated by the company increased in many cases. This was due to the fact that these figures on materials costs include certain elements of overhead and also were adjusted to compensate for inventory losses caused by the falling market. The materials costs so computed are not, therefore, direct costs of manufacture strictly speaking, but they do indicate some of the cost problems confronted by the company during this period. The actual changes between 1929 and 1933 in net realized prices of the International Harvester Co. for 12 implements and machines are shown in table 2, as compared with changes in labor costs and in season's materials costs during the same period. Machines in this and the two following tables are shown in two groups. The first group includes products for which there was little technological change during the period; technological change was substantial for the items in the second group.

This record shows that season's material costs, probably for the reasons just outlined, actually increased for 6 of the 10 products whose design remained relatively unchanged from 1929 to 1933. In contrast, labor costs declined in all cases, although the amount of the decline ranged from a negligible decrease in the case of the cream separator to 39 percent for the tractor. When labor and materials costs are combined, the 10 implements are about equally divided, 4 showing increases in direct costs and 5 decreases, while 1 remained unchanged.

¹⁸ See appendix to ch. II, p. 100 ff.

¹⁹ For a detailed description, see appendix to ch. II, p. 98 ff.

Net realized prices, on the other hand, were reduced for 9 of these 10 machines. There is no clear relationship between the amount or direction of change in season's labor and materials and in net realized prices. Of the 2 items whose net realized prices rose during the period, the tractor plow showed a decrease of 8 percent in labor and materials costs, while the grain drill showed a 24-percent increase. The largest decrease in net realized price was for the cream separator, for which season's labor and materials costs were unchanged during the period. This lack of any close relationship between changes in season's labor and material costs and changes in prices is not surprising in view of the importance of the company's view of the market and competitive situation in determining the level of its prices.

TABLE 2.—*Changes in materials and labor costs and in prices for 12 selected implements, 1929-33*

[Percent change]

Machine	Adjusted costs ¹			Net realized price ²
	Materials	Labor	Labor and materials	
Group I: ³				
Spring-tooth harrow	+10.3	-13.9	+5.2	-5.7
Cultivator	+15.6	-15.0	+7.1	-3.1
Tractor plow	-1.9	-23.5	-8.0	+1.3
Corn binder	-2.4	-11.8	-5.7	-6.2
Grain binder	-5.3	-12.6	-7.8	-5.6
Disk harrow	+4.7	-10.9	+2.3	-6.4
Side-delivery rake	+5.1	-5.8	+3.1	-6.0
Manure spreader	+2.0	-17.9	-2.9	-4.5
Cream separator	+6	-7	0	-12.8
Regular tractor (1929-32)	-6	-38.7	-10.9	-8.3
Group II: ³				
Mower	+5.5	-6.9	+1.2	-6.1
Grain drill	+38.4	-7.4	+24.4	+4.7

¹ Adjusted for labor in foundry. All cost figures are "season's" or actual costs. Materials costs include elements of overhead and adjustments for losses on inventory valuation, as market prices were declining.

² Net realized prices have been estimated by the company by deducting from the wholesale contract price all discounts available to dealers. In the case of the volume and quantity discounts, whose size varies with the amount of business involved (see pp. 93-94), an estimate of the average rate secured by dealers has been made by the company. These prices do not take account of the crop-guarantee plan as a deduction from wholesale contract price.

³ The design of implements in group I was not changed appreciably between 1929 and 1933; that of the implements in group II was changed.

Source: International Harvester Co.

More important, the comparatively small decline in agricultural implement prices during the depression is probably attributable to the belief on the part of responsible officials, already described, that price reductions would not expand sales sufficiently to prevent a reduction in actual net income. In view of their assumptions on this point, company executives were reluctant to reduce prices drastically, since such a policy did not seem a practicable means of conserving corporate assets by minimizing losses during a period of stress. Moreover, competing concerns apparently followed the same general policy, so that there was little competitive pressure for wider price reductions, except in isolated cases of particular machines. In other words, the general belief in the International Harvester Co., and probably in the industry, that further price reductions during depressions would not greatly increase sales and that a substantial cut by any one company would be quickly followed by the others, operated as strong pressures against greater price reduction.

This general belief is not confined to officials of the International Harvester Co. It is held widely and probably for similar reasons

by businessmen in many lines of activity, particularly in the manufacture of producers' durable goods. Some of the economic implications of such a policy are considered at length in another report prepared by the Bureau of Labor Statistics for the Temporary National Economic Committee.²⁰ It may be suggested at this point, however, that although the effect of any economically feasible price reductions by a single company during the later stages of depression are limited, there is a possibility that prompter price readjustments throughout the economy during the early stages of a downswing might well limit the rapidity and extent of the subsequent decline. As already noted, it is beyond the scope of this study to appraise the economic implications of the International Harvester Co.'s price policy, either during the depression or subsequently.

SEASON'S COSTS AND PRICES, 1933-37

The International Harvester Co. increased the prices of most of its products during 1934 and 1935. Direct costs—costs of labor and purchased materials—increased during this period. It was also believed by the company that moderate price increases would not significantly retard sales and that such increases would therefore permit the company to compensate for its loss of income during the depression. By 1937 there had been further increases in direct costs and in prices.

The relationship between price increases and changes in season's labor and material costs during the entire period of the upturn from 1933-37 is shown in table 3. Again, there is no very clear correspondence between the percentage changes in season's costs of labor and materials and the percentage changes in net realized prices when the implements in group I are ranked in the order of the percentage increases. Next to the largest increase in costs is shown by the grain binder; yet the realized price for this product increased least.

TABLE 3.—*Changes in materials and labor costs and in prices for 12 selected implements, 1933-37*

[Percent change]

Machine	Adjusted costs ¹			Net realized price ²
	Materials	Labor	Labor and materials	
Group I: ³				
Spring tooth harrow.....	+3.3	+37.9	+9.2	+15.7
Cultivator.....	-0.4	+41.2	+8.8	+9.8
Tractor plow.....	+8.0	+25.8	+12.2	+9.8
Corn binder.....	+4.2	+35.9	+14.6	+10.4
Grain binder.....	+10.4	+29.6	+16.3	+3.2
Disk harrow.....	-1.3	+19.6	+1.6	+ .0
Side-delivery rake.....	+3.0	+27.9	+7.2	+14.6
Group II: ³				
Mower.....	+7.4	+34.2	+16.0	+17.1
Manure spreader.....	+2.9	+46.1	+11.9	+12.0
Hammer mill.....	-0.2	+6.3	+2.3	+17.7
Separator.....	+10.5	+48.7	+28.3	+10.9
Grain drill.....	-24.1	+13.6	-15.6	+14.0

¹ Adjusted for labor costs in foundry. All cost figures are "season's" or actual costs. Materials costs include elements of overhead and adjustments for inventory valuation.

² Net realized prices have been estimated by the company by deducting from the wholesale contract price all discounts available to dealers. In the case of the volume and quantity discounts, whose size varies with the amount of business involved (see pp. 93-94), an estimate of the average rate secured by dealers has been made by the company.

³ The design of implements in group I was not changed appreciably between 1933 and 1937; that of the implements in group II was changed.

Source: International Harvester Co.

² See Monograph I, ch. II.

SEASON'S COSTS AND PRICES, 1929-37

Changes in net realized prices and season's labor and materials costs from 1929 to 1937 are given in table 4. Over this period the indirect elements affecting season's materials costs, such as overhead on interplant transfers of parts and adjustments for inventory valuation, probably do not affect the comparison seriously, so that it may be taken as an approximate indication of the trend of direct costs. Between 1929 and 1937 season's materials costs rose for all implements, labor costs for 10 of the 12 implements, and net realized prices to the company were increased also for 10 of the 12 implements. There was, however, no close relationship between the extent of the changes in their net realization.

In the preceding analysis, only certain elements of cost—season's labor and materials—have been considered in their relation to prices. Fixed costs—overhead—have not yet been discussed (except as they are included in materials costs), largely because of the extreme complexity of the issues raised. Nevertheless, overhead is an essential component of cost and cannot be ignored. An important difficulty in relating prices to these costs arises out of the fact that overhead per unit of production increases very rapidly as production declines. Consequently, if prices were to follow the variations in season's costs, it would be necessary to raise prices sharply during depressions and to reduce them as business picked up and overhead could be spread over a larger number of units. The draw-backs to this policy are so obvious that it has never been seriously considered.

TABLE 4.—*Changes in materials and labor costs and in prices for 12 selected implements, 1929-37*

[Percent change]

Machine	Adjusted costs ¹			Wholesale contract price	Net realized price ²
	Materials	Labor	Labor and materials		
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Group I: ³					
Spring tooth harrow.....	+13.9	+18.7	+14.9	+2.0	+9.0
Cultivator.....	+15.1	+20.1	+16.5	+4.1	+6.5
Tractor plow.....	+6.0	-3.7	+3.2	+11.2	+11.2
Corn binder.....	+1.7	+20.0	+8.1	+6.1	+3.5
Grain binder.....	+4.5	+13.2	+7.3	None	-2.5
Disk harrow.....	+3.4	+6.5	+3.9	-0.7	+2.0
Side delivery rake and tedder.....	+8.2	+20.5	+10.5	+5.9	+7.7
Group II: ³					
Mower.....	+13.4	+24.9	+17.4	+12.4	+10.0
Manure spreader.....	+5.0	+20.1	+8.7	+4.8	+7.0
Farmall tractor.....	+1.3	-15.2	-3.2	-1.8	+4.0
Separator.....	+11.1	+47.7	+28.3	-3.4	-3.4
Grain drill.....	+5.0	+5.2	+5.1	+17.0	+19.4

¹ Adjusted for labor costs in foundry. All cost figures are "season's" or actual costs. Materials costs include elements of overhead and any adjustments for inventory valuation.

² Net realized prices have been estimated by the company by deducting from the wholesale contract price all discounts available to dealers. In the case of the volume and quantity discounts, whose size varies with the amount of business involved (see p. 93-94), an estimate of the average rate secured by dealers has been made by the company.

³ The design of implements in group I was not changed appreciably between 1929 and 1937; that of the implements in group II was changed.

Source: International Harvester Co.

The extent of these changes in total season's or actual factory costs, including other cost elements, as well as labor and materials, for a group of 12 implements is shown in table 5 for the downturn from 1929 to 1933 and for the upturn between 1933 and 1937. These figures are computed on the basis of the usual conventional accounting assumptions; depreciation is written off at approximately the same rate in bad years as in good.²¹

TABLE 5.—*Changes in total season's factory cost*

	Percent change			Percent change	
	1929-33	1933-37		1929-33	1933-37
Spring tooth harrow.....	+34.0	-9.6	Manure spreader.....	+12.9	-0.7
Cultivator.....	+40.4	-11.5	Hammer mill.....	(1)	-22.5
Tractor plow.....	+34.4	-24.6	Side delivery rake and tedder.....	+44.3	-21.6
Grain binder.....	+14.9	-4.5	Disk harrow.....	+32.3	-20.9
Corn binder.....	+18.3	-4.6	Cream separator.....	+76.6	-18.6
Mower.....	+23.2	-2.5	Grain drill.....	-81.8	-42.9

¹ Not made in 1929.

Source: International Harvester Co.

NORMAL COSTS AND PRICES, 1935-37

Largely because season's costs are so affected by the number of units produced, "normal" costs are calculated by the company. They include, as already indicated, an overhead charge based on an assumed "normal" volume of production. For this reason, company officials consider normal cost as the cost to be followed in determining prices. However, normal costs are, with a few exceptions, only computed at irregular intervals and are not available on a comparable basis prior to 1932.²²

A comparison between percentage changes in normal costs and in wholesale contract prices from 1935 to 1937 is made in table 6. While there is a correspondence between direction of change—that is, costs and prices both rose during the period—it would be difficult to show from this table that prices of individual products are related to normal costs in any direct and simple way. The dollar figures underlying these changes have been examined (although their confidential nature prevented publishing them) and they support this conclusion.²³ Other factors, such as market or competitive conditions, were undoubtedly important in the fixing of the prices for individual products.

²¹ See appendix to ch. II, p. 98. In years in which machines are deemed to have been used excessively, some additional depreciation is charged.

²² For a more detailed discussion of the concept of "normal" costs, see appendix to ch. II, p. 100.

²³ Of course, percentages calculated on different bases are not strictly comparable. Since these costs are in each case substantially smaller than the prices of the same implements, a given dollar increase in normal costs will be reflected in a larger percentage increase than will the same dollar increase in prices.

TABLE 6.—*Changes in normal costs and prices, 1935-37*

	Percentage change in normal costs— Jan. 1, 1935— July 27, 1937 ¹	Percentage change in wholesale con- tract prices— Jan. 31, 1935— Oct. 31, 1937 ²
Spring tooth harrow.....	+17.5	+8.3
Cultivator.....	+22.5	+14.1
Tractor plow.....	+15.4	+12.0
Grain binder.....	+14.7	+6.7
Corn binder.....	+14.0	+7.6
Mower.....	+10.1	+12.2
Manure spreader.....	+8.2	+12.2
Tractor.....	+6.1	+4.2
Hammer mill.....	-.5	+8.8
Side delivery rake and tedder.....	+18.8	+11.2
Disk harrow.....	+22.5	+6.3
Cream separator.....	+15.6	+6.5
Grain drill.....	+11.0	+15.1

¹ This is a period for which normal cost differences for a wide range of machines was calculated by the company.

² Price decisions reached during the summer of 1937 became effective for the new season at the end of October 1937. Net realized prices would afford a more accurate comparison than changes in list price, but they were not available for the specific dates.

Source: International Harvester Co.

LONG-TERM CHANGES IN PRICE

The detailed information obtained in the course of this survey related largely to price changes and price policy over relatively short periods of time. Some information is available from governmental sources, however, regarding price trends over long periods of time. Table 7 compares the 1937 prices of selected agricultural implements with the levels of 1913.²⁴ Attention must be drawn to the difficulty of comparing prices over this long a period due to the radical changes in the design and quality of nearly all articles of this character.

TABLE 7.—*Changes in prices of selected agricultural implements, 1913-37*

Implement:	[Index (1913=100)]
Tractors (2-plow).....	61.9
Combines (harvester-thresher).....	74.7
Plows (4-bottom tractor).....	98.2
Plows (3-bottom tractor).....	115.8
Plows (2-bottom tractor).....	134.8
Grain threshers (large).....	144.4
Grain binders.....	159.1
Plows (2-horse, walking).....	165.5
Harrows (spring tooth).....	166.3
Hayloaders.....	188.5
Plows (1-horse, walking).....	191.0
Cultivators (1-row, riding).....	198.6
Grain drills.....	199.0
Mowers.....	200.5
Rakes (sulky).....	210.2
Harrows (disk).....	210.4

Source: Bureau of Labor Statistics.

Striking differences are evident between the price trends of the newer mechanized equipment and that of the older horse-drawn equipment. A partial explanation for these divergent trends may lie

²⁴ Computed from annual averages of the prices reported by farm-machinery manufacturers to the Bureau of Labor Statistics for use in its wholesale price index.

in the fact that the demand for mechanized equipment has constantly expanded, while that for horse-drawn equipment has remained static or declined, so that there has been less opportunity to achieve production economies for the latter than for the former group of implements. The officers of the company state that in addition the possibilities of major cost saving, technological changes in construction and method of production are substantially less on the older implements which have been in production for many years, than on the newer types of machinery whose early, relatively crude models are represented by the 1913 prices.

DISCOUNTS AND TERMS OF SALE

It has been pointed out that net realizations to the company as well as the actual price paid by dealers depends not only upon the list or contract price but also upon many collateral terms of sale. During the period since 1929 there have been a series of changes in collateral terms which, although they were not equivalent to major changes in price level, nevertheless had significant influence upon the price structure. The particular terms regarding which data are available are: Quantity discounts, vendor's option discounts, cash discounts, volume discounts, and a few other specific terms.

Before any of the following discounts are figured, the company allows a trade discount on all machines that are quoted at list prices. These trade discounts also differ from time to time and affect the net realization.

(1) The quantity discount, discontinued in 1935, was based upon the number of units a dealer purchased. The amount of the discount varied for different implements. In each case it was based on the number of units ordered at the time the contract for the year was signed. Subsequent orders received the same discount rate. The size of the discount that applied for the 1934 season is illustrated by the following machines:

Units taken:	Discount per unit
Spring tooth harrows:	
20-40 sections	\$0. 25
40-100 sections .....	. 50
100 or more sections	1. 00
Tractor cultivators: ¹	
5-10 cultivators	1. 00
10-20 cultivators	2. 00
20 or more cultivators	3. 00
Spreaders:	
8-14 spreaders	2. 00
14 or more spreaders	5. 00

¹A double-row cultivator counts as two tractor cultivators in determining quantity discount.

Starting with the 1935 season, the quantity discount, which had been a long-established feature of the price structure of the International Harvester Co., was discontinued.²⁵ The reasons for this decision merit particular attention as they illustrate the complexity of price policy and the process whereby price decisions are formulated. This decision to eliminate the quantity discount was made in July or August of 1934 to be effective for the 1935 season. The two previous years, 1932 and 1933, were exceptionally bad for the implement industry and for the International Harvester Co. The company was anxious

²⁵ At the same time the volume discount was increased, although not to the same extent. See p. 94.

to put its operations on a profitable basis. Sales had increased and showed signs of continuing to increase during the 1934 season. Some costs were higher than in 1933. However, the company was impressed with the fact that any large increase in price would probably give rise to considerable sales resistance.²⁶ Consequently, it was decided to raise contract prices moderately and to increase net realizations further by eliminating the quantity discount. A further reason for cutting out the quantity discount was provided by protests from dealers about the way in which the quantity discount had worked against the small and in favor of the large dealers. Its elimination would allay these protests.

(2) *Volume discounts*.—While the amounts of the quantity discounts remained virtually constant between 1929 and 1934, the volume discount was changed several times. The volume discount differs from the quantity discount in that it is based upon the total amount of business done with the company over the period of a year, rather than upon the size of individual orders. Prior to the 1939 season, the dealer was eligible to receive his full volume discount only if all matured obligations had been paid to the company.

In 1929 the volume-discount structure was as follows on a dealer's "general line" purchases (the discount in each case applying only to the volume of sales within each corresponding size of sales bracket):

Total net business:	Discounts (percent)
\$5,000 and less than \$10,000-----	1
\$10,000 and less than \$15,000-----	1½
\$15,000 and less than \$20,000-----	2
\$20,000 and less than \$30,000-----	2½
\$30,000 and less than \$40,000-----	3
\$40,000 and less than \$50,000-----	4
\$50,000 and over-----	5

When the quantity discount was eliminated in 1934 for the 1935 season, an extra one-half percent was added to the volume discount in the brackets between \$5,000 and \$50,000. Thus, the elimination of the quantity discount did not have its full impact on net realization because it was partially compensated for by this increase in volume discounts.

In the fall of 1938 a new schedule of volume discounts was announced by the company which substantially reduced the discount for purchases in excess of \$20,000 and only slightly reduced them for purchases between \$10,000 and \$20,000, the range of the discount structure being curtailed from 1 to 5 percent to 1 to 2 percent. These reductions in the volume discount amounted to an increase in the "effective price" and in net realization.

Company officials state that the reduction in the range of the volume discount was made because of complaints received from small dealers by the Federal Trade Commission in the course of its investigation of the agricultural-implement industry to the effect that the spread of

²⁶ It is not clear whether this opinion of the company officials should be considered as an exception to their general belief in the inelasticity of demand for agricultural implements or as a fear of damaging the good will of the company, even though no immediate effect of consequence on the volume of sales could be expected. (See above p. 83.)

the discount was such as to give large dealers an unfair advantage.²⁷ It also was motivated in part by the desire to "play safe" with possible interpretations and rulings under the Robinson-Patman Act.

In comparing the volume discount in 1929 with that of 1939, it must be noted that the discount applied to many more machines and implements on the latter date. A further significant change, introduced for the 1939 season, removed the contingency "that all mature obligations must be paid before the dealer is eligible to receive the volume discount their purchases otherwise have earned."

(3) The vendor's option discount to dealers provided that if they accepted delivery of orders at the discretion of the International Harvester Co. before certain dates, depending upon the region and implements involved, the dealer would be entitled to a 2-percent discount. Instituted in 1926, the discount was intended to reduce the cost to the company of storage of completed machines and implements. As has been noted (p. 12), with a "long line" of implements it is frequently necessary for production schedules to be completed considerably in advance of the season of peak dealer demand. The company is thus confronted with serious storage difficulties which could be lessened if dealers would accept delivery on orders at the discretion of the company.

At the start of the 1933 season—that is, in the autumn of 1932—the decision was made to discontinue this vendor's option discount. With an unchanged wholesale contract price, this obviously would mean a small rise in net realization to the company. The discount was said to be abandoned because vendors were no longer taking advantage of it in sufficient numbers to justify its continuance.

(4) Cash discounts have long been characteristic of the price structure and currently amount to 5 percent. The settlement period within which the cash discount can be claimed varies for different implements. For instance, for the central zone in the 1939 contract on tractor plows, the discount on spring shipments applied up to May 1, 1939, while on listers the discount on spring shipments applied up to June 1, 1939, subject to a "carry clause" which extends this period on implements unsold at the expiration of the period.²⁸

A clause was inserted for the first time in the 1939 contracts which provided for an additional cash discount of 1 percent on the dealer's total net purchases of general line goods if all of the dealer's matured

²⁷ On Oct. 13, 1938, Mr. William S. Elliott, vice president and general counsel of the International Harvester Co., wrote to Dr. Francis Walker, chief economist of the Federal Trade Commission, regarding this action. In this letter he said:

"For the coming contract year beginning Nov. 1, 1938, we are also making substantial changes in the volume discounts heretofore allowed to dealers on total purchases under their annual contracts. Volume discounts (which were not originated by our company) have been an old custom in the trade. We believe they have a sound basis in the fact of substantial savings in sales expense and the fairness of sharing these savings with the dealers. Of late, however, there has been some feeling among smaller dealers, which is noted in your report, that existing volume discounts are making competition difficult between large and smaller dealers in nearby territories. We do not think many dealers would like to see volume discounts wholly abolished, and after a good deal of consideration it has seemed to our sales executives that the fairest plan for all concerned would be to reduce the amount and spread of the discounts.

"The old discount plan stepped up (on the income-tax nonretroactive bracket basis) to a maximum of 5 percent on purchases above \$50,000. Under the new scale now adopted for the coming year, the maximum discount will be 2 percent allowed on purchases above \$30,000.

"We believe this reduced scale will leave all dealers on a reasonably competitive basis with each other, at the same time treating them fairly through sharing in the savings on volume transactions."

²⁸ The "carry clause" on the tractor plow provided: "All machines shipped during the season, if on hand unsold May 1, may be settled for by note due Dec. 1, subject to 5 percent discount for cash Oct. 1."

"All machines shipped after May 1, if on hand unsold Dec. 1, but not exceeding 50 percent, may be settled for by note due July 1 of subsequent year with interest after maturity, less 5 percent for cash May 1 of subsequent year."

obligations arising from purchases from the company were fully paid by November 30, 1939. This clause was intended to encourage the settling of accounts by dealers at the end of the season. It was thought that the saving in collection expenses would probably justify the additional discount.

(5) *Special allowances*.—In addition to the four discounts discussed above, special allowances from wholesale prices were made on some products, including tractors and cream separators. For instance, from 1926 to 1932, if dealers met certain requirements regarding service facilities for tractors, their account was credited to the amount of \$50 per tractor sold. Other special allowances applicable to the regular Farmall tractor provided that a harrow, plow, or mower would be donated to the first farmer purchasing a tractor in each township, and in 1933 each dealer was credited with \$80 for each combination sale of Farmall tractor and implement, provided this was passed on to the purchaser.

Account must also be taken of the strictness with which credit terms are administered, the pricing of attachments, field changes, and the crop guaranty plan used in 1932–33. During the depression (1930–33), the credit position of dealers received more careful scrutiny, and more severe requirements were instituted. Since 1933 a more prompt settlement of claims has been required, a smaller volume of obligations to the company permitted, and stricter terms on carry-over accounts established. Making credit terms more stringent is equivalent to an increase in the net realizations of the company.

The crop guaranty plan inaugurated by the company in 1932, on the other hand, amounted to a reduction in effective price during the depression. This plan gave the farmer some protection against the strain of meeting fixed obligations in a period of rapidly changing prices by tying the prices of certain implements to the prices of cotton, corn, and wheat. If the prices of these commodities fell below a designated level, prices of these implements would be reduced. Only a portion, 40 percent, of the purchase price was subject to this guaranty. This figure was selected because in the trade it was the custom on more expensive machinery to require 20 percent cash, 40 percent a year later, and 40 percent in a second year. This plan probably resulted in some increase in sales, while net realizations on these contracts were reduced about 2.3 million dollars from nominal price levels during the 2 years the plan was in effect.

The actual wholesale price of agricultural implements may also be changed by a variation in the number of attachments which are considered standard equipment. After some detailed study, it would appear there has been no substantial change in recent years in standard attachments on equipment.

Finally, the warranty made on the machine and the field changes introduced by the company is an aspect of the effective price. By its warranty, the company guarantees the satisfactory performance of the machine for a designated period. The company makes field changes at its expense after the implements have been put in operation, particularly with new models which may reveal defects. These field expenses have fluctuated between \$12,000 and \$200,000 per year in the period 1931–37.

PRICES AND NET REALIZATIONS

The combined effect of these changes in terms of sale upon the relationship between dealers' contract prices and net realizations is shown in table 7, for the periods 1929-33, 1933-37, and 1929-37. The comparison relates, of course, to directly measurable terms such as cash or quantity discounts and does not indicate the effect of such factors as the terms of warranty or the crop guaranty plan.

Between 1929 and 1933 net realizations generally declined somewhat less than contract prices. Of the 10 implements whose contract prices were reduced during this period, 7 showed smaller reductions in net realization and only 3 showed slightly larger reductions. For one implement—the tractor plow—the contract price was unchanged, but the realization increased by 1.3 percent, while for the grain drill both price and realizations rose, but the latter advanced further.

For the period 1933-37 the opposite trend predominated, and realizations in general rose less than prices. Contract prices were advanced for all 12 implements; for 8 of these, realizations rose less; for 3, there was a greater rise in realizations than in price; and for 1, the rise in price and realization was the same.

It would seem, therefore, that price quotations for the products of the International Harvester Co. may have slightly overstated both the decline in actual realizations during the recession of 1929-33 and their advance during the recovery of 1933-37.

For the entire period 1929-37, realizations seem to have increased somewhat more than prices for most of the implements listed. This may largely reflect the elimination of the quantity discount in 1935.

TABLE 8.—*Changes in dealers' contract price and net realized price*¹ for selected implements

[Percent]

Machine	1929-33		1933-37		1929-37	
	Whole-sale contract price	Net realized price	Whole-sale contract price	Net realized price	Whole-sale contract price	Net realized price
Group I: ²						
Spring-tooth harrow.....	-7.5	-5.7	+10.3	+15.7	+2.0	+9.0
Cultivator.....	-4.1	-3.1	+8.6	+9.8	+4.1	+6.5
Tractor plow.....		+1.3	+11.2	+9.8	+11.2	+11.2
Corn binder.....	-6.1	-6.2	+12.9	+10.4	+6.1	+3.5
Grain binder.....	-5.3	-5.6	+5.6	+3.2		-2.5
Disk harrow.....	-7.2	-6.4	+7.0	+9.0	-0.7	+2.0
Side delivery rake and tedder.....	-7.7	-6.0	+14.7	+14.6	+5.9	+7.7
Group II: ²						
Mower.....	-5.2	-6.1	+18.6	+17.1	+12.4	+10.0
Manure spreader.....	-6.4	-4.5	+12.0	+12.0	+4.8	+7.0
Farmall tractor.....					-1.8	+4.0
Separator.....	-15.5	-12.8	+14.3	+10.9	-3.4	-3.4
Grain drill.....	+2.0	+4.7	+14.7	+14.0	+17.0	+19.4
Hammer mill.....			+20.4	+17.7		

¹ Net realized prices have been estimated by the company by deducting from the wholesale contract price all discounts available to dealers. In the case of the volume and quantity discounts, whose size varies with the amount of business involved (see p. 93-94), an estimate of the average rate secured by dealers has been made by the company.

² The design of implements in group I was not changed appreciably between 1929 and 1937; that of the implements in group II was changed. For other periods, the grouping is somewhat different. (See tables 2 to 4.)

Source: International Harvester Co.

APPENDIX TO CHAPTER II

ACCOUNTING TECHNIQUES

Three types of costs calculated by the International Harvester Co.—season's, normal, and specific—are discussed in detail below as illustrative of the conventional accounting practices followed by the company.

Season's Costs.

These costs are computed once a year at the close of the manufacturing season—that is, after October 31. Season's costs are intended to show the actual cost of operation per unit of output of specific machines. These are the costs used in calculating the profitability of the business and in figuring the rate of return on investment. They are also compared with normal costs, particularly for labor and materials, as a check on the efficiency of manufacturing operations. For each size and model of all machines and implements this season's cost is built up as follows:

(a) From engineering specification books, which contain detailed descriptions and numbers for each individual part of a machine, the amount in hundredweight of each type of raw material required per 100 parts is listed. For F-20 tractors, for instance, raw materials processed in the Farmall plant are summarized into gray iron castings, malleable castings, cast steel, pressed steel, hot- and cold-rolled bars, hot-rolled strips, alloy steel, hot-rolled plates, strip steel, and spring wire, blue-black and terne sheets.

(b) The individual quantities are then multiplied by the season's price for each particular type of raw material. (1) If the material, such as a grade of steel of a particular size, is purchased outside the company, the season's costs per hundredweight is the purchase price with a "first-in-first-out" inventory correction. That is, if a large inventory was on hand at the start of the season and this was valued below prices prevailing during the year, then the season's cost would be below the average purchase price during the year. If the steel were manufactured by the Wisconsin Steel Works, the steel-producing plant of the International Harvester Co., the season's costs of the material would be calculated at market value, in essentially the same way as though it were purchased from another company. (2) If the part were fabricated in another plant of the company the season's cost would be calculated on the basis of the normal factory cost (explained later in this section) at the other plant plus freight charges between plants. (3) If the part were cast in the foundry of a plant the weight of the particular kind of casting would be multiplied by the season's cost per unit of weight in the foundry after a "first-in-first-out" inventory adjustment.

(c) "Materials" in the cost-accounting records thus include: (1) The raw materials purchased outside the company, such as wire or steel of certain descriptions. (2) "Castings," generally produced at the same

plant in a foundry. All costs—materials, labor, and overhead—of the foundry appear as materials in the costs records for finished machines.

(3) "Interworks collateral" which consists of parts shipped from other plants and includes "normal" labor and overhead, plus freight. (4) Purchased collateral which consists of completed parts such as bearings, rubber tires, carburetors, or wheels purchased from other firms.

(d) The season's labor costs for each machine are calculated by first ascertaining the labor costs that can be directly attributed to each machine. This is done by adding up the costs of all the piece-work operations directly made on the particular machine or its parts. This sum is known as prime labor. Then other labor costs in the factory, such as trucking, inspection, practice runs, set-ups of equipment, and payments to guarantee certain minima per hour are allocated to individual items of production in proportion to the amount of prime labor they contain. These other labor costs are known as "labor adjustment." The sum of the "prime labor" and "labor adjustment" is called "direct labor."

(e) Overhead includes wages of employees not directly engaged in processing or assembling machines and parts, salaries of supervisory organization, repairs and maintenance, power, heat, light, depreciation, real estate, and personal property taxes, insurance, etc. Overhead expense is allocated to individual machines on the basis of direct labor costs. Income taxes, capital losses and gains, as well as reserves for special maintenance, development and extension, fire insurance, foreign losses, and exchange fluctuations are not allocated in this way but are lump deductions from "trading profits."

(f) To this total factory cost is added an item called "sales, service, collection, administration, and bad-debt expenses" which is calculated by allocating the total expenditure on these items during the season to individual implements in proportion to their total sales value during the season.¹

Season's costs per unit of product are calculated to show actual costs on the average during a season, allocated to individual machines and implements by acceptable accounting practices. Certain limitations to the applicability of season's costs to the purposes of this study must be indicated. The present inquiry is directed particularly to the relations between the variations in labor, material, overhead, total season's costs, and prices. Season's labor or materials costs for an implement or a machine may fluctuate, however, without any change in total season's cost per machine. This may occur when there is a change in the proportion of parts or materials fabricated in the company as compared to those purchased from other firms. Under the system of calculating season's costs outlined above, "material" costs would usually tend to decrease and "labor" costs to increase with a decrease in the proportion of outside purchases. A transfer of fabrication from one plant to another might alter the components of cost while leaving the total unchanged, particularly when one of the plants involved in the transfer is the one in which production is mainly centered and costs are figured. Making more parts in such a "home" plant would usually increase the proportion of season's costs that were calculated as "labor" and reduce the proportion calculated as "materials." Variations in the normal costs of parts secured from

¹ These costs are first allocated as closely as possible among three main groups of products—implements, trucks, and twine. Then the allocation to individual implements in accordance with sales value is made.

other plants of the company also may not necessitate any change in total season's costs.

Normal Typical Machine Costs.

Normal costs reflect the current price of materials, current wage levels, and overhead based on an estimated "normal" operation of manufacturing facilities. "Normal operations" are based mainly on the experience of past years (both good and bad) and to some degree on new factors which may reasonably be expected to influence normal production in future years. Normal labor and material costs are built up for certain typical machines monthly, and for other machines whenever desired in order to show the way in which costs are moving during the year (for decisions relating to prices and to cost-reducing expenditures) and to appraise the effectiveness of various management units. These normal costs are built up as follows:

(a) From the specification books which describe each part of a machine in detail, the amount of each kind of raw material is noted. These materials, summarized into the same classification used in season's costs, are multiplied by prices which are usually the prevailing prices. If the effect of a possible increase in raw-materials prices is being studied such increased prices rather than current prices may be utilized. In the case of castings and other parts made within the firm, the price is intended to reflect what the company can make them for at prevailing prices of raw materials and wages, with the application of overhead based on normal operations. For this reason, these prices of castings may not reflect actual current costs. Inefficiencies due to low volumes of production, the introduction of a new line, inexperienced workmanship, or accidents are not reflected in the material costs which enter into normal costs. The cost of materials may thus be either higher or lower than actual prices.

(b) Normal labor costs are calculated in much the same way as normal materials costs. The prime labor cost calculated on the basis of piece rates is corrected by the amount of a normal adjustment which is not influenced by inefficiencies of various sorts. If wage rate changes are contemplated such rates rather than those prevailing would be used in these normal calculations.

(c) Normal "burden" is intended to represent the overhead which in the judgment of the management can be expected with "normal" operations and is prorated to individual machines on the basis of current direct labor.

(d) As a matter of actual record, normal factory costs are calculated every month for tractors and trucks, but for other machines only infrequently. When occasions arise which require decisions about the price or production of a particular machine, the normal cost of that machine will be calculated. General changes in raw material prices or wage rates are apt to call for general calculations of normal costs for the whole line of machines. Normal costs for all typical machines have been calculated on the following dates since the end of 1934; January 1, 1935; September 5, 1935; January 1, 1937; April 1, 1937; July 27, 1937; and March 15, 1938.²

Changes from month to month in the normal labor and materials costs of typical machines may appear because of changes in design or construction, in the method of manufacture, the introduction of new

² The system of complete normal costs was first introduced in 1932 although normal burden had been used for many years.

capital equipment, variations in the cost of parts purchased outside the company, and variations in labor rates and prices of materials.

Differences between "normal" and "season's" cost may be due to the fact that—

(a) Average costs of material used throughout the year, including that on hand at the beginning of the year, may vary widely from the market price in effect at the time normal cost is computed. The same difference characterizes labor costs.

(b) Normal costs may be based on probable or expected changes in wage rates or price of materials.

(c) Season's costs may reflect unusual or inefficient practices due to the introduction of new types of product, and the effect of abnormal or subnormal volume of production which causes overhead expenses to be prorated over a greater or lesser number of units than contemplated in the normal burden rate which is used in normal costs.

Specific Costs.

When it is necessary to decide in which plant to make a particular part or whether it should be purchased outside the company, the "specific cost" of the part concerned is calculated. Specific cost includes labor and materials costs and that part of the overhead which can be directly attributed to the particular part. The season's or normal cost of making a part might exceed the price which an outside company would quote and still the company may reasonably decide to continue to manufacture within its own plants. If production on the part were discontinued, overhead would have to be allocated to a smaller number of items, increasing the cost of each and reducing or eliminating the savings which might be derived by purchasing the part from another company. The decrease in cost on the specific part would be counterbalanced by increased costs on other parts. The specific cost thus considers the net effect on total costs of the transfer of production between plants and of purchases from other firms.³

Specific costs are not ordinarily calculated for whole machines as units because the decision to keep or drop a machine or implement from the line of goods sold by the International Harvester Co. is predominately influenced by market considerations. The inference is not that costs play no part, but rather that differences in estimates of expected sales are so great compared to probable cost differences that sales volume is the dominant consideration. In making this type of decision it is very important, in the view of officials of the International Harvester Co., to appraise the effect on the company's prestige of a full complement of machines.

Specific costs are most frequently calculated to check on recommendations of the engineering department regarding the purchase of parts from outside concerns. There is occasionally some difficulty in securing a complete understanding of the attitude toward costs represented by "specific cost" calculations.

³ Specific costs are a very close approximation to the economist's concept of "marginal costs." Certain decisions are apparently made in "marginal" terms, although usually it is the differential cost of rather large increments which is considered.

CHAPTER III

THE MOVEMENT OF WAGES AND LABOR COSTS

Wages, or, more accurately, labor costs, are one of the major elements in costs, and for that reason are a significant factor in price determinations. In a period like the last decade, when wage rates have varied considerably—falling in the depression years after 1929 and rising again during the recovery—there has been much talk of the effect of wage rate changes on prices. During the early years of the depression it was argued that wages should be reduced so that prices could be cut. As wage rates were raised after 1933 the rise was cited as a primary reason for advancing prices of industrial products. In all of that discussion, little distinction was made between wage rates and average hourly earnings—that is, the rate of return for an hour of work on the average and labor costs per unit of output. Although it is this latter figure which is relevant to price policy and with which industry is primarily concerned, very little information is publicly available on labor costs. Changes in wage rates are customarily measured by average hourly earnings, although it is known that earnings vary not only with wage rates but also with changes in machinery, in the worker's efficiency, in the flow of materials, or their quality, with changes in the make-up of the labor force, etc.

One of the objects of this survey was to determine, in the International Harvester Co., how important changes in labor costs had been in total costs and in price changes, as well as to determine how closely labor costs varied with the reported wage rates and average hourly earnings to which the public is accustomed. Some analysis was also made of the principal reasons given by the company for wage changes during recent years.

This report gives particular attention to wage rates, average hourly earnings, and labor costs in the year 1933 as compared to 1929, 1937 as compared to 1933, and 1937 as compared to 1929. The years 1929 and 1933 mark turning points in economic activity for the economy as a whole as well as for the company. The period of acute depression was the most prolonged this country has known since the 1870's. As a consequence, the comparisons made in this chapter, of necessity, give great emphasis to changes in volume of business. This is especially important with reference to the analysis of labor costs in relation to total costs and to prices, since total costs per unit of output are greatly affected by variations in the amount of factory overhead and distribution costs charged to each unit in depression and recovery. In more normal years, changes in prices and in all the cost items, particularly those dependent largely on volume changes, are apt to be smaller. The span of years which this study covers offers, however, an excellent opportunity for observation of the processes by which changes in policy are determined because of the many new policies occasioned by the unusual circumstances of the times.

WAGE RATES AND WAGE POLICIES

The history of wage-rate changes in the International Harvester Co., which forms the background of this chapter, is one of comparatively few changes through the last half of the decade of the twenties, followed by wage cuts as depression became severe in the early thirties, and by advances from 1933 to 1937. The more detailed study of the company's policies with regard to wage-rate changes centers in the period 1936-37, when a succession of wage increases was made.

Although frequent changes were made in individual wage rates, the record of wage rates in the company following the depression of 1920-21 shows a long period of virtually no horizontal, general changes from 1925, when the wage cuts of the depression of 1921 had been largely restored, until late in 1931, when the effects of depression were being felt severely. In November 1931 a general wage reduction of 15 percent, affecting all employees of the company, was made. Following this reduction, wage rates were again reduced by 10 percent on October 1, 1932. As business activity began to improve, and the N. R. A. movement for higher wages began, wage rates were increased and, on July 10, 1933, the 10-percent cut of 1932 was restored. Additional increases brought company-wide wage rates up to 97 percent of their 1929 level by February 1934. Certain automotive plants of the company received further increases in March and April 1934 to bring them considerably above the 1929 level. From November 1934 to July 1936 a series of increases was granted, a few plants at a time, the total increases given employees of the various plants ranging from about 7 to about 16 percent. On November 22, 1936, a 4-cents-an-hour increase was granted to the works in the smaller cities and in the South, and a 5-cents-an-hour increase to the large city plants. A similar increase was granted on March 14, 1937.

Summarizing, between the high point of 1929 and the low point of 1933, wage rates were uniformly reduced 23.5 percent in all manufacturing plants of the company and increases in wage rates from the low point of 1933 to the high of 1937 ranged from 52 to 69 percent for the various plants. The resulting net increases between 1929 and 1937 varied from 16 to 29 percent. These are the basic company-wide rate changes with which this chapter is primarily concerned.¹

These company-wide changes in rates were in most cases applied to the rather complex schedule of basic wage rates—most of them on a piece-rate basis—which has been in effect for some time. Rates vary in different plants, for different products, and for different occupations. This rate structure is based in large part on a system of job analysis or occupational rating, modified from time to time, which has been in effect at most of the plants of the company since 1923. The system is intended to determine the relative wage to be paid on the basis of an evaluation of the relationship of one occupation to another, taking

¹ Just as in the case of the price agreed upon between the International Harvester Co. and its dealers, so in the price of labor services, the subsidiary terms of the contract may be important for the interpretation of the quoted rate. That is, movements of wage rates or average hourly earnings over a period of time may not correctly reflect the price of labor services. For instance, a variation in the number of holidays a year with pay, vacations with pay, or pension plans, is a change in the "price" of labor. When vacation plans for factory employees are liberalized, this is in effect an increase in the "price" of labor. Such changes are virtually impossible to incorporate in average rates or other statistics and, insofar as they vary, published figures must fail to record the change in the price of labor accurately. Moreover it is often extremely difficult to separate those terms of a labor agreement which are an aspect of "the price of labor" from other terms. This limitation may be rather serious in interpreting certain wage data. None of these factors has been taken into consideration in the wage figures contained in this report.

into consideration the degree of skill, effort, responsibility, and knowledge that each job requires, and the nature of the working conditions under which it must be carried on. Time and motion studies are made for operations to be paid under piece rates and the rates are so fixed that an average worker making "reasonable" application of time and effort may receive previously determined occupational earning rates. If for reasons beyond the control of the individual worker, such as faulty material or equipment, his piece-rate earnings are reduced, he is given an allowance to bring his wages up to his piece-work average earnings.² Approximately three-fourths of the wage earners of the International Harvester Co. are paid primarily on the basis of piece rates; the remainder work on time rates. Within each occupational group on time rates, individual workmen are rated "A," "B," or "C" and receive rates differentiated within the limits set for the occupation.

This discussion is not concerned with the original process of determining these rates in detail but rather with the process by which the changes in the general level of wage rates in the company, summarized above, have been made. No consideration has been given in this report to any wage-rate problem arising since March 1937. Action on the more general wage changes with which this chapter is concerned, as in the case of changes in prices, is taken by the officials of the company. In local matters affecting a single plant or a small group of employees, the plant superintendent and the executives of the manufacturing department in the Chicago offices of the company make decisions for the company.

In the period before 1937 the employees of the company, insofar as they took part in collective bargaining on labor conditions, were represented in works councils. These councils were established in 1919 and the years immediately following. The scope of their activity varied somewhat between plants. Their functions centered around safety, welfare, recreation, working conditions, and wages and hours. In 1936 the National Labor Relations Board ordered the disestablishment of the works council at the Fort Wayne Works and in April 1937, following the decisions of the United States Supreme Court on the constitutionality of the National Labor Relations Act, the company discontinued the works councils at all plants in the United States. Independent unions were organized in some plants and locals of national labor organizations were organized in others. The company subsequently signed contracts in most plants. A case is now pending before the National Labor Relations Board concerning the status of six of the independent unions. The history of employee organization in the company is summarized briefly at the end of this chapter.

The wage cuts of the depression years, summarized above, and most of the wage increases of the recovery years, were made on the company's initiative.³ Studies by the works councils on the rising

² When a complete stoppage of production occurs and employees are not sent home but are assigned to other jobs, such as cleaning machines, they are paid their day work rate which is approximately 80 percent of their occupational earning rate.

³ All the material for this section was obtained from the company executives who were concerned with these wage-rate changes.

cost of living in 1933-34 may have had some influence on the restoration of wage cuts at that time, but in the main it is probably fair to say that the atmosphere of the times, including N. R. A. pressure for wage increases and the wage advances granted in many other industries, were primarily responsible. The wage increases in the automobile industry were particularly important, officials state, because of the company's growing business in motor trucks and tractors and the proximity of some of its plants to automobile plants.

For the most part, the present inquiry into circumstances surrounding wage-rate changes as reported by officials emphasized the wage-rate advances of 1936 and 1937. On November 22, 1936, an increase amounting to 4 cents an hour was announced for all wage earners in the plants located in the smaller cities and in the south and of 5 cents an hour in the large city plants. On March 14, 1937, wages were again advanced by the same amounts. It is difficult to reconstruct at this time the atmosphere of those years. In the background of this situation was the growing labor unrest and the pressure of labor organization in many industries not previously well organized such as automobiles and rubber; the organizing drives of the Committee for Industrial Organization in some of the Harvester plants; the decision of the Labor Board outlawing the works council plan of the Fort Wayne Works; and the requests of representatives of some of the works councils for wage increases in the fall of 1936 and early in 1937. In particular the executives were undoubtedly concerned by the sit-down strikes in the automobile and rubber industries and were wondering "how far this thing would go."

The company was particularly anxious to avoid labor trouble. With business increasing at a very rapid rate in 1936 and with every evidence that 1937 would be the best year of business since 1929, it is to be expected that officials would be willing to pay higher wages and to meet other demands of their employees in order to maintain production schedules.

Prior to the advances of November 1936 and March 1937, a list of wage-rate changes that had been made recently by large companies was collected from newspaper files, and these were before the management when its decisions were made. Wage increases in other industries apparently were considered more significant than those made by other companies in the agricultural implement industry. The automobile industry and other industries employing large numbers of skilled workers appeared to have more direct influence on the demand for the type of highly skilled wage earners needed by the company than did other implement producers. Company officials indicate the importance of general bidding for skilled wage earners in periods of expanding production by referring to the data in table 9, showing annual separations from the company as a percentage of the number of total employees for the period 1931-38. The percentage of quits is an indication of the competition in the labor market. In bad years like 1932, few persons leave their jobs. But beginning in 1935, the number increased gradually until, in 1937, quits reached 8.3 per cent of the number employed.

TABLE 9.—*Separations from the International Harvester Co., 1931-38*[Percent of average number employed]¹

Year	Cause of separations			Year	Cause of separations		
	Retire- ments on pensions and deaths	Quits	Dis- charges		Retire- ments on pensions and deaths	Quits	Dis- charges
1931.....	2.4	5.5	1.2	1935.....	1.5	7.9	2.6
1932.....	4.2	1.3	.6	1936.....	1.8	8.1	1.9
1933.....	5.6	2.1	.9	1937.....	1.5	8.3	1.0
1934.....	2.8	4.3	1.4	1938.....	2.1	1.9	.3

¹ Includes factory and office employees but not field staff.

Source: International Harvester Co.

Wage changes presented a peculiarly difficult problem to the executives of the company in this period because of the difference in the labor market for highly skilled mechanics who work on tractors, trucks, and similar machines and the less skilled wage earners in implement plants. In January, February, and March of 1937, firms in the automobile and steel industries, in particular, were increasing wages of their employees substantially. The skilled mechanics in the tractor and truck works of the International Harvester Co., with these increases in mind, were requesting further advances. However, if increases were granted in tractor and truck works, employees of the company in implement works, for whom there was no exceptional demand, might likewise seek increases, protesting against discrimination. The company, therefore, believed it necessary to increase the wage rates of all of its employees if it increased them for any.

The executives of the company also had before them normal costs calculated for certain typical machines as they would be after an assumed wage increase. These normal costs were calculated on typical machines as of January 1, 1937, and April 1, 1937, although prices on most products in the International Harvester Co. had been set for the 1936-37 season, that is, they had been announced in November 1936. It is probable that the wage increase of November 1936 had been anticipated in the prices for the 1937 season, but that the March increase had not been expected in the preceding September or October.

With information at hand on the effect of proposed wage changes on their own costs and on wage changes in other industries, and with the general background of labor unrest threatening to interrupt production schedules in a prosperous year, the increases of November 1936 and March 1937 were made. It is impossible to say with any certainty which influences weighed most heavily in these decisions. It appears probable that union activities in other industries and the threat to their own production schedules which the company executives saw in these activities were most influential.

Although undoubtedly of less importance than other factors, the competition of the automobile and similar industries for skilled workers had considerable weight. Its secondary importance is attested by the view held by a number of the officials of the company that the March increase was really unnecessary and unwarranted by any change in economic conditions, while others were of the opinion that

the 1937 wage increases were necessary if the International Harvester Co. was to continue to operate its plants without labor stoppages.

WAGE RATES AND AVERAGE HOURLY EARNINGS

Although the process of wage determination consists of setting time or piece rates, it is customary to measure what factory workers receive in terms of average hourly earnings. In the International Harvester Co., average hourly earnings of all employees, including salary workers, advanced sharply, along with the cost of living, during the war and early post-war years, to a peak in 1920. They were reduced in 1922, then raised again in 1923 and 1924 to a level above that of any year except 1920 and 1921. During the last half of the decade of the 1920's, changes were slight. In 1929 average hourly earnings were 9 percent below the peak year of 1920. Changes in the average hourly earnings of all employees of the International Harvester Co., including both wage and salary workers, in the period 1914-38, are shown in table 10, with earnings in the year 1926 as 100. The relative annual average hourly earnings since 1926, of wage earners only, is given in table 11 with 1926 as 100. The record for employees in truck and tractor works and in implement plants is shown separately in the latter table.

Although no major changes in wage rates were made in the late twenties average hourly earnings did increase slightly in this period, as indicated in table 10, as a result of improved managerial arrangements, better tools, and, in some cases, minor upward readjustments in individual piece rates.

The question whether changes in average hourly earnings and in wage rates always parallel each other, particularly in times of great economic change, was analyzed in detail for the International Harvester Co., to determine the truth of the customary assumption that differences between these two measures of return to labor, if differences exist, are minor. In addition to surveying changes in earnings for all of the employees of the company, figures were made available by the company for 12 of its plants to avoid any possible effect of differences in products or plant location.

The extent of the difference between the movement of average hourly earnings and wage rates⁴ in the case of each of the company's plants manufacturing a selected list of typical machines is shown for the years 1930-37 on charts III through XIV.⁵ It should be noted that the charts show only the relative changes in rates and average hourly earnings in this period, with the amount of earnings in 1930 taken as the base for comparison. The percentage changes in wage rates and average hourly earnings from 1930 to 1933, from 1933 to 1937, and from 1930 to 1937 are shown in table 12.

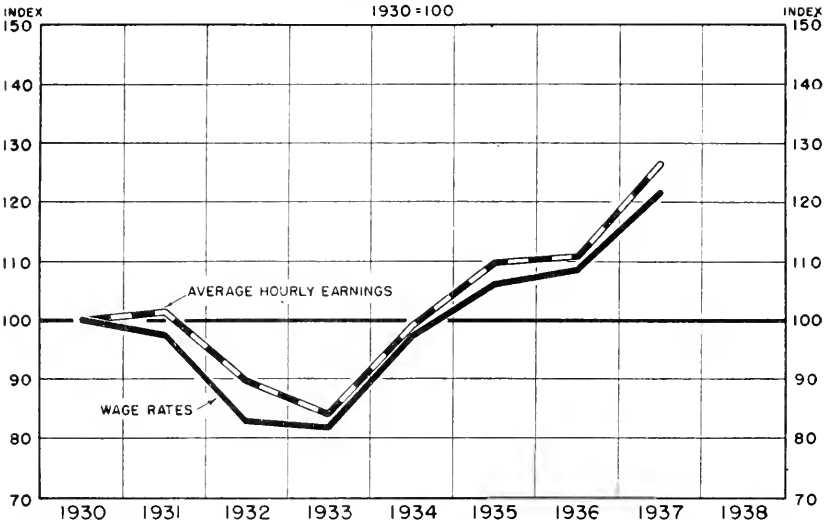
In the years 1930 to 1933, when volume of operations was greatly reduced, the decline in average hourly earnings lagged behind that of wage rates in these 12 plants. This lag can be attributed in part to the laying off first of those employees with shorter service and who were earning lower rates. The extent of the decline during the period as a whole differed somewhat, but not appreciably. The reduction in average hourly earnings was larger in six of the plants and smaller in the other six.

⁴ All wage rate data in this and the two following sections are averages for the year. For this reason the percentage changes from 1929 to 1933 and from 1933 to 1937 given on page 63 differ from those presented here.

⁵ The data on which these charts are based are in appendix B, table II.

Chart III:

WAGE RATES AND AVERAGE HOURLY EARNINGS 1930-1937
INTERNATIONAL HARVESTER CO.
WEST PULLMAN PLANT

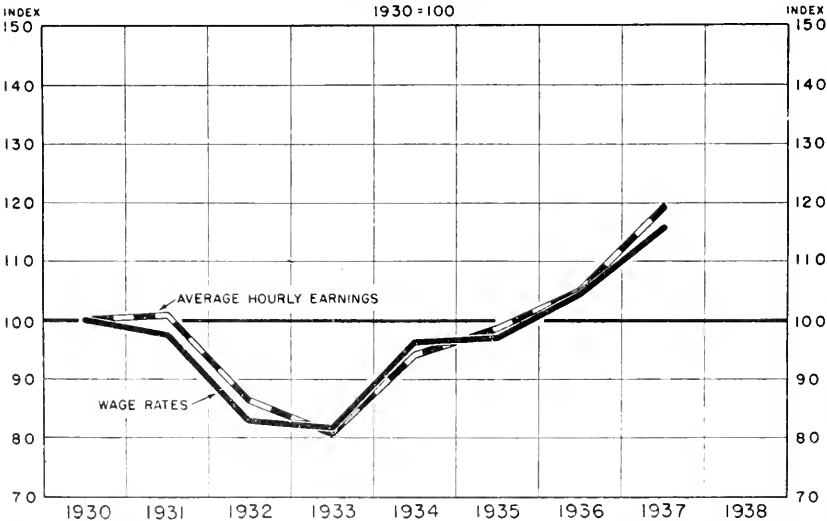


U S BUREAU OF LABOR STATISTICS

SOURCE INTERNATIONAL HARVESTER CO

Chart IV

WAGE RATES AND AVERAGE HOURLY EARNINGS 1930-1937
INTERNATIONAL HARVESTER CO.
AUBURN PLANT



U S BUREAU OF LABOR STATISTICS

SOURCE INTERNATIONAL HARVESTER CO

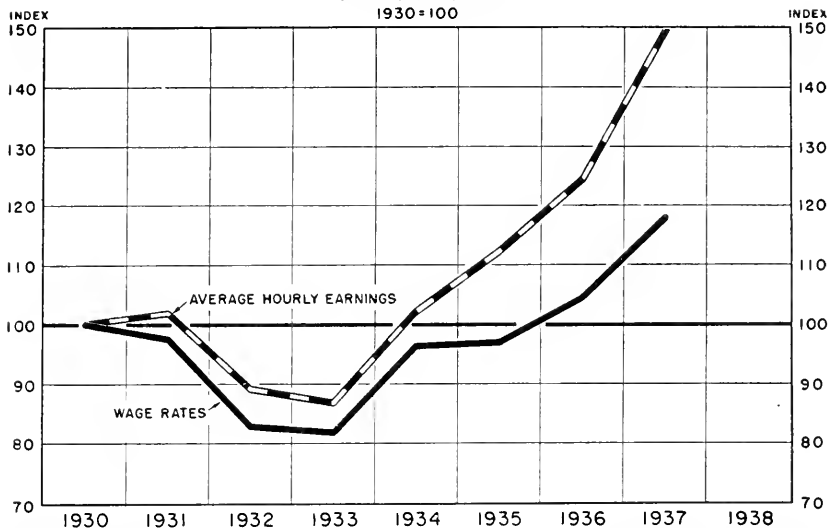
Chart V

WAGE RATES AND AVERAGE HOURLY EARNINGS 1930-1937

INTERNATIONAL HARVESTER CO.

CANTON PLANT

1930=100



U. S. BUREAU OF LABOR STATISTICS

SOURCE: INTERNATIONAL HARVESTER CO.

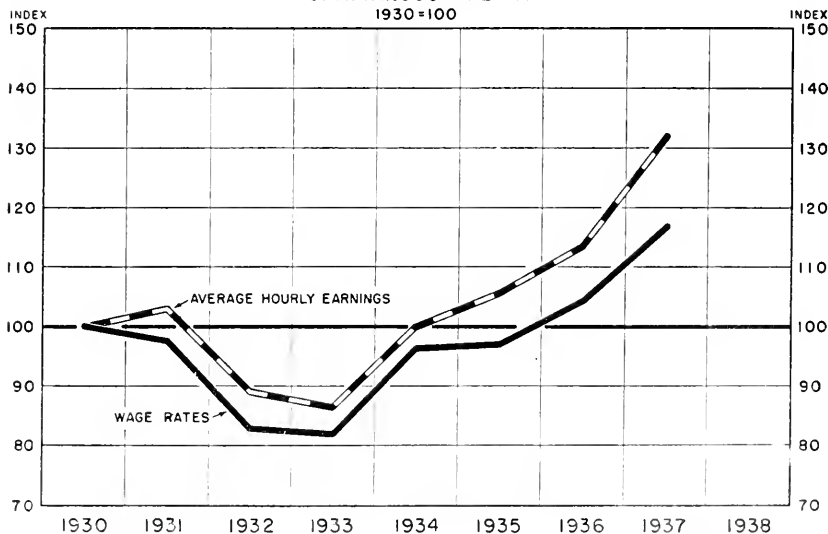
Chart VI

WAGE RATES AND AVERAGE HOURLY EARNINGS 1930-1937

INTERNATIONAL HARVESTER CO.

CHATTANOOGA PLANT

1930=100



U. S. BUREAU OF LABOR STATISTICS

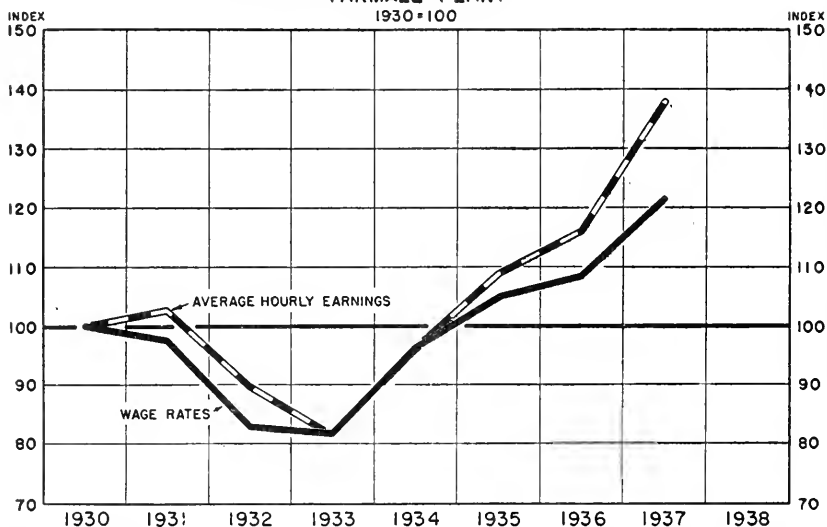
SOURCE: INTERNATIONAL HARVESTER CO.

Chart VII.

WAGE RATES AND AVERAGE HOURLY EARNINGS 1930-1937

INTERNATIONAL HARVESTER CO.

FARMALL PLANT



U S BUREAU OF LABOR STATISTICS

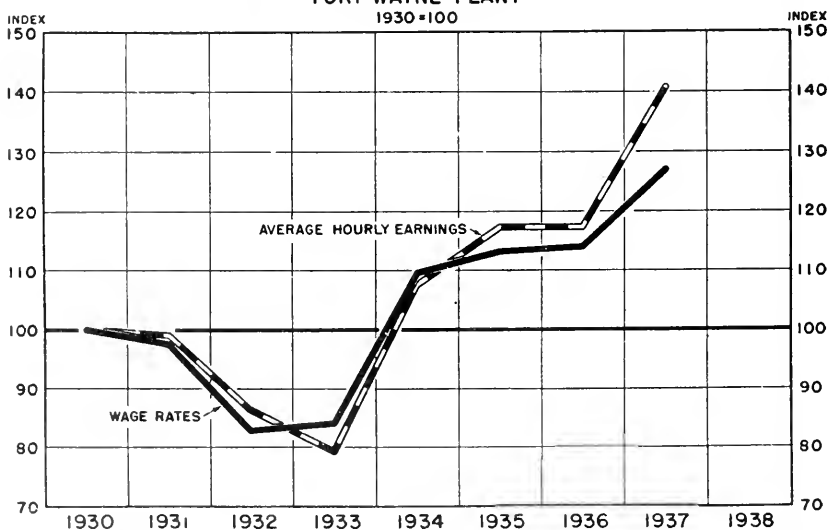
SOURCE: INTERNATIONAL HARVESTER CO.

Chart VIII.

WAGE RATES AND AVERAGE HOURLY EARNINGS 1930-1937

INTERNATIONAL HARVESTER CO.

FORT WAYNE PLANT

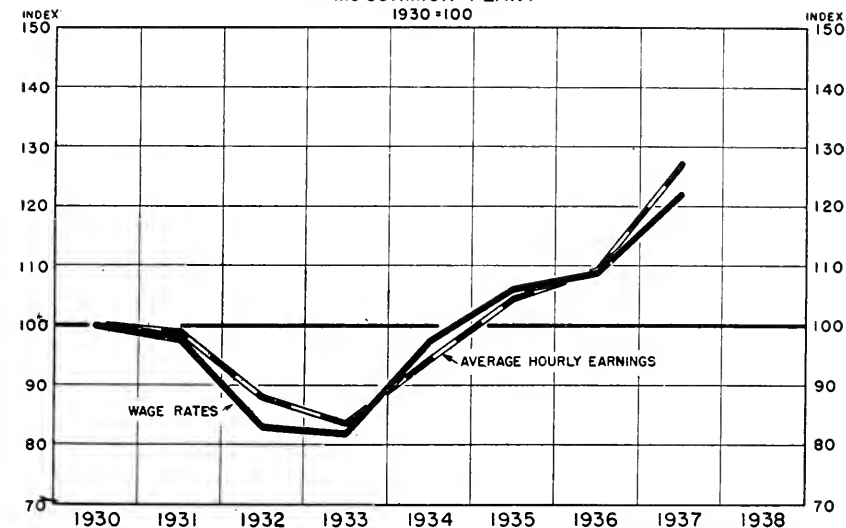


U S BUREAU OF LABOR STATISTICS

SOURCE: INTERNATIONAL HARVESTER CO.

Chart IX.

WAGE RATES AND AVERAGE HOURLY EARNINGS 1930-1937
INTERNATIONAL HARVESTER CO.
Mc CORMICK PLANT
 1930 = 100

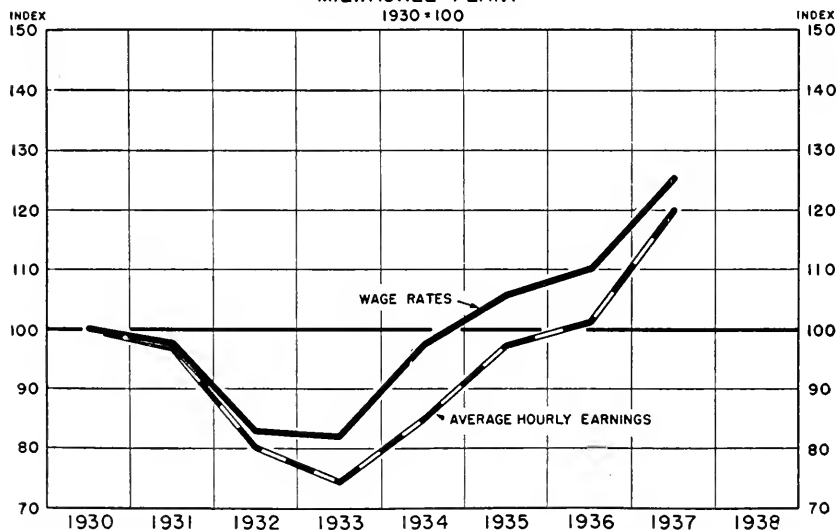


U. S. BUREAU OF LABOR STATISTICS

SOURCE: INTERNATIONAL HARVESTER CO.

Chart X.

WAGE RATES AND AVERAGE HOURLY EARNINGS 1930-1937
INTERNATIONAL HARVESTER CO.
MILWAUKEE PLANT
 1930 = 100



U. S. BUREAU OF LABOR STATISTICS

SOURCE: INTERNATIONAL HARVESTER CO.

Chart XI.

WAGE RATES AND AVERAGE HOURLY EARNINGS 1930-1937
INTERNATIONAL HARVESTER CO.
ROCK FALLS PLANT
1930=100

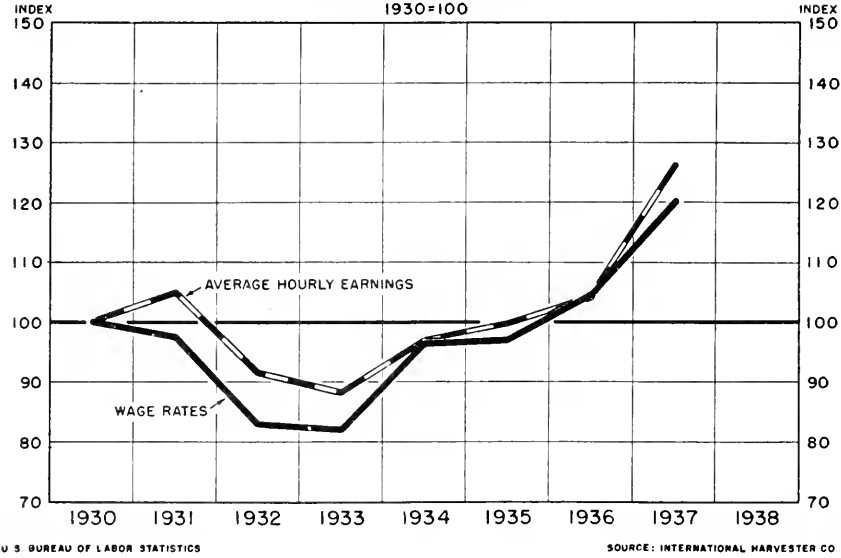


Chart XII.

WAGE RATES AND AVERAGE HOURLY EARNINGS 1930-1937
INTERNATIONAL HARVESTER CO.
RICHMOND PLANT
1930=100

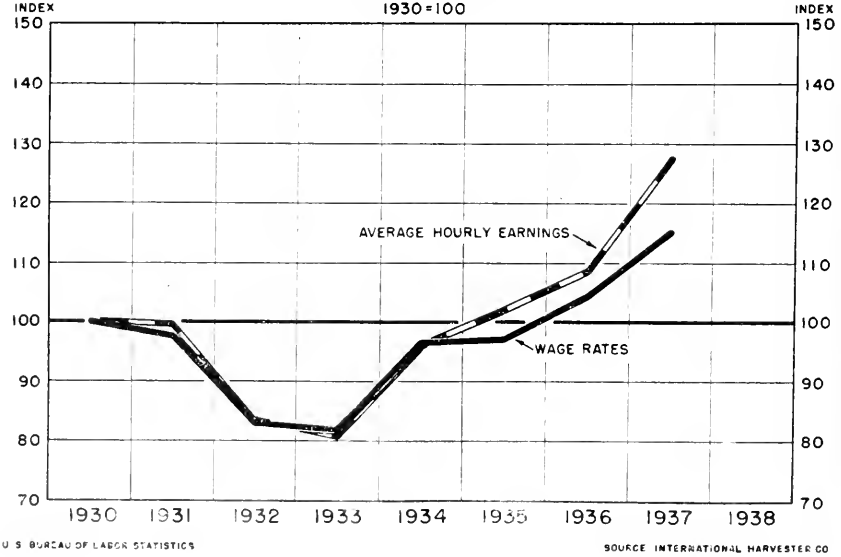
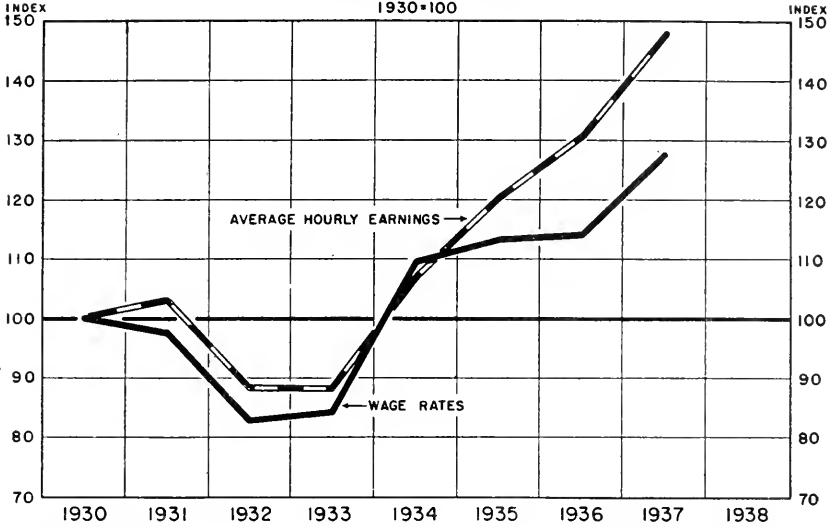


Chart XIII

WAGE RATES AND AVERAGE HOURLY EARNINGS 1930-1937
INTERNATIONAL HARVESTER CO.
SPRINGFIELD PLANT
 1930=100

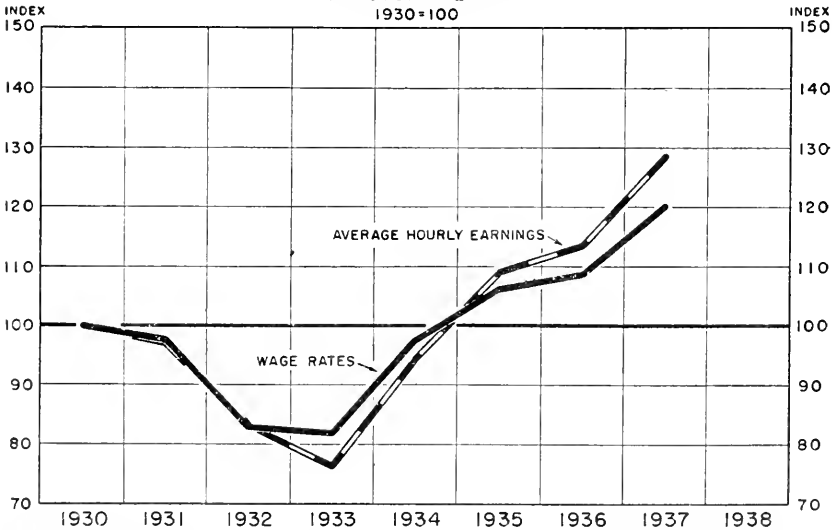


U. S. BUREAU OF LABOR STATISTICS

SOURCE: INTERNATIONAL HARVESTER CO.

Chart XIV

WAGE RATES AND AVERAGE HOURLY EARNINGS 1930-1937
INTERNATIONAL HARVESTER CO.
TRACTOR PLANT
 1930=100



U. S. BUREAU OF LABOR STATISTICS

SOURCE: INTERNATIONAL HARVESTER CO.

TABLE 10.—Average hourly earnings of wage and salary workers at International Harvester Co. truck, tractor, and implement plants in the United States, 1914–38

[1926=100]

Year:	Index numbers	Year:	Index numbers
1914.....	43.0	1927.....	100.0
1915.....	44.7	1928.....	101.8
1916.....	47.8	1929.....	101.2
1917.....	60.0	1930.....	100.3
1918.....	76.6	1931.....	104.3
1919.....	91.2	1932.....	95.8
1920.....	111.4	1933.....	89.0
1921.....	108.6	1934.....	98.3
1922.....	84.9	1935.....	107.5
1923.....	92.3	1936.....	111.8
1924.....	97.7	1937.....	129.6
1925.....	98.4	1938.....	135.2
1926.....	100.0		

Source: International Harvester Co.

TABLE 11.—Average hourly earnings of wage earners, United States plants of International Harvester Co., 1926–37

[1926=100]

Year	All United States works (index)	Truck and tractor works (index)	Implement works (index)	Year	All United States works (index)	Truck and tractor works (index)	Implement works (index)
1926.....	100.0	100.0	100.0	1932.....	87.0	82.8	88.9
1927.....	100.3	99.0	101.5	1933.....	81.7	76.6	85.8
1928.....	102.2	100.1	103.2	1934.....	97.1	93.5	96.1
1929.....	101.9	99.7	102.4	1935.....	108.6	105.3	105.8
1930.....	100.0	97.4	101.0	1936.....	113.4	109.9	110.8
1931.....	100.3	96.9	101.2	1937.....	132.3	127.9	129.2

Source: International Harvester Co.

In the recovery period, from 1933 to 1937, the increase in average hourly earnings was greater than the increase in wage rates in 11 of the 12 plants. In some cases the differences were substantial. Thus, in the Canton plant, wage rates increased by 43.8 percent and average hourly earnings by 72.3 percent. In the Fort Wayne plant wage rates rose 50.8 percent and average hourly earnings increased 77.8 percent.

TABLE 12.—Changes in wage rates and average hourly earnings, United States plants of International Harvester Co., 1930–33, 1933–37, 1930–37

Plant	Percent change 1930–33		Percent change 1933–37		Percent change 1930–37	
	Wage rates	Average hourly earnings	Wage rates	Average hourly earnings	Wage rates	Average hourly earnings
West Pullman.....	-18.1	-15.9	+48.4	+50.4	+21.5	+26.4
Auburn.....	-18.1	-19.2	+41.3	+47.5	+15.7	+19.2
Canton.....	-18.1	-13.3	+43.8	+72.3	+17.8	+49.4
Chattanooga.....	-18.1	-13.5	+42.6	+52.6	+16.8	+32.0
Farmall.....	-18.1	-18.2	+48.4	+68.5	+21.5	+37.9
Fort Wayne.....	-15.8	-20.8	+50.8	+77.7	+27.0	+70.8
McCormick.....	-18.1	-16.5	+49.0	+52.2	+22.0	+27.1
Milwaukee.....	-18.1	-25.6	+53.0	+61.3	+25.3	+20.0
Rock Falls.....	-18.1	-11.9	+46.8	+43.4	+20.2	+26.3
Richmond.....	-18.1	-19.3	+40.7	+57.9	+15.2	+27.4
Springfield.....	-15.8	-12.1	+51.3	+68.1	+27.4	+47.9
Tractor.....	-18.1	-23.6	+46.5	+68.0	+20.0	+28.4

Source: International Harvester Co.

The more rapid rise in earnings than in rates during the years 1933-37 is to be explained by a number of factors—the steadier operations accompanying higher levels of output, the improvement in certain cutting tools purchased as normal supplies unaccompanied by cuts in piece rates, the improved labor skill which comes from practice on the same model (with frequent changes in models, this is an important consideration), and promotions from the lower level of each occupational grouping toward the upper limit as the same workers remained with the plant a longer time. There was also some increase in overtime work, and in some instances a greater amount of effort was expended by wage earners because of the management's desire to fill orders. During periods of active business, piece-work employees are apt to be more willing to step up their output, knowing that they will be increasing their current earnings without endangering the supply of work for them to do. An offset to these tendencies is the fact that as production increases there tends to be a larger percentage of employees in the lower rate brackets.

The importance of changes in the amount of effort expended by workers is especially difficult to evaluate. But there can be no doubt that wage earners, even on piece rates, work at different rates of exertion during the day. Management has a measure of this in the amount of electric power used per hour in the plant. During the latter part of the afternoon work frequently slows down. With a large number of orders and with the general impetus of larger output foremen can probably get more effort and work out of wage earners than during slack times.

In view of this record, there can be little doubt of the importance of refraining from drawing final conclusions about average hourly earnings of International Harvester Co. employees from data on their wage rates or about wage rates from figures on average hourly earnings.

WAGE RATE CHANGES AND LABOR COSTS

Management is not primarily interested in the relation between wage rates and average hourly earnings but in the effect of changes in either of them on labor costs per unit of product. The discussion which follows is concerned primarily with the effect of changes in the wage rates paid to employees of the International Harvester Co. on labor costs in the depression years 1929-33; the recovery from 1933-37; and the entire span of 9 years, 1929-37. The analysis is confined to the same selected list of 13 machines described in chapter II.

This analysis indicates, in general, that during a period of declining business activity substantial cuts in wage rates did not bring a proportionate reduction in labor costs for these implements, largely because of changes in the character of the labor force, leaving more senior, skilled, and highly-paid men on the job. In the recovery, on the other hand, labor costs increased less than wage rates were advanced, partly because of economies in operation, the introduction of new technology and new processes already developed, which it became profitable to introduce when volume increased, or which were introduced to improve quality or for other reasons than economy; and partly because of the hiring of more men in the semiskilled and unskilled grades at lower rates of pay. Over the longer period 1929-37 it is difficult to generalize; for some implements the changes in labor costs were greater

than in wage rates in these plants; for others the reverse was true. For 5 of the 13 machines, changes in technology were so great that direct comparisons, even of labor costs, are difficult.

In this section, the cost analysis makes use of actual direct labor cost on each machine, called "season's labor costs" and described in detail in the appendix to chapter II. "Season's labor costs" cover only a part of expenditures for labor. Vacation pay and taxes for old-age and unemployment insurance, and labor used in making repairs—which, to the extent that they are for factory labor, vary more or less closely with direct factory labor costs—are not included, nor are salaries of office employees in factories. These items form a part of what is known as "burden" or overhead expense. Neither is account taken in "season's labor costs" of salaries of salesmen nor of staff in the head office. These omissions, which would be serious if total figures of labor costs were under consideration, do not alter the conclusions of this chapter concerning the relative changes in wage rates in comparison with unit labor costs, so long as there was no important change in the share of labor costs included in "burden." As far as could be determined, there were no important changes of this character from 1929–37.

Not only is certain overhead in the form of labor omitted from "season's labor costs," but the accounting item "materials" also includes a considerable expenditure for labor. Parts, whether purchased from other firms or made in other plants of the company, are charged to each of these 13 machines as costs of materials. Still more significant is the fact that labor on castings is charged as materials, regardless of where the castings are made. This item is such a large factor in the costs of the implements described here that a special computation of labor costs, including labor on castings, has been made for use in this report. These special figures are referred to as "adjusted labor costs." The importance of these adjustments may be indicated by the change effected in labor costs on machines finished at the Farmall plant. For these machines, the analysis of total "season's costs" as regularly computed in three categories—"labor," "materials," and "burden"—included under "labor" in 1936 only about 49 percent of total pay roll for the season.⁶ When the direct labor in castings was transferred from "materials" to "labor," about 75 percent of the total pay roll applicable to the products turned out at this plant was classified under "labor" costs. There is no reason to expect that these relationships would not be fairly characteristic of other plants.

Since wage rate data were not available for 1929, the first comparisons presented here are between the percentage changes in wage rates from 1930 to 1933 and the percentage changes in labor costs from 1929 to 1933 for a group of 13 typical machines. There were no general changes in wage rates between 1929 and 1930, and consequently, the difference of a year in the date of reference has had no appreciable effect on the comparisons.⁷ As in the tables in chapter I, the ma-

⁶ Part of this labor expenditure was made in other plants of the company. Adjustments have also been made for repairs and for changes in opening and closing "work in process" inventories. The term "total pay roll" includes all labor in the foundry, factory, and engineering department of the plant, and all salaried supervisory employees, including the plant superintendent.

⁷ Comparisons between changes in wage rates, average hourly earnings, and labor costs for these 13 machines are subject to the further limitation that for each machine the data on wage rates and hourly earnings are for all the workers in the plant making the machine and not just those employees who worked on that machine. It is impossible to say how much effect the inclusion in these figures of the rates and earnings of employees working on other machines has had, but it appears likely to have been small.

chines are arranged into two groups: The design of those in group II changed appreciably during the period covered, while the design of those in group I remained relatively unaltered.

From 1929 to 1933, a period of declining business activity and sharply reduced demand for agricultural implements, wage rates for the year on the average were cut by 18.1 percent in all of the plants manufacturing the machines under examination.⁸ Labor costs for these machines declined less than wage rates, with one exception, as may be seen in table 13. The exception was the tractor plow for which labor costs declined 23.5 percent, as compared with a decline of 18.1 percent in wage rates.⁹ This exception is important, however, since it was one of the largest sellers among the 13 listed here.

While it is impossible to give a complete explanation of this difference in the trend of wage rates and labor costs, it may be observed that there is undoubtedly a tendency for less efficient utilization of labor on hourly rates or receiving hourly minimum pay as production declines. Moreover, as work slackens, a larger proportion of workers will be put on hourly rates, since many piece workers, unable to earn their minimum rates due to lack of work, will receive instead the hourly minimum to which they are entitled under the company's plan. These factors would tend to make for a smaller reduction in labor costs than in wage rates. In the cases of tractor plows and Farmall tractors, it is possible that changes in design or technique on these machines may have resulted in the greater decline in labor costs than in wage rates.

TABLE 13.—*Changes in wage rates¹ and labor costs, International Harvester Co., 1929–33*

Implement	Plant at which produced	Wage rates	Labor costs
		Percent	Percent
Group I: ²			
Spring tooth harrow.....	Auburn.....	-18.1	-13.9
Cultivator.....	do.....	-18.1	-15.0
Tractor plow.....	Canton.....	-18.1	-23.5
Grain binder.....	McCormick.....	-18.1	-12.6
Corn binder.....	do.....	-18.1	-11.8
Manure spreader.....	do.....	-18.1	-17.9
Farmall tractor ³	Farmall.....		
Side delivery rake and tedder.....	Rock Falls.....	-18.1	-5.8
Disk harrow.....	do.....	-18.1	-10.9
Cream separator.....	Milwaukee.....	-18.1	-7
Group II: ⁴			
Mower.....	McCormick.....	-18.1	-6.9
Grain drill.....	Richmond.....	-18.1	-7.4

¹ Wage rate figures are for 1930 rather than 1929, but probably this difference is not important. (See text, p. 116). They refer to the wage rates paid all employees of the plant in which the implement is made, rather than to the wage rates of employees working only on the implement. Since the wage rate changes were all plant-wide, this should not affect the comparisons.

² The design of implements in group I was not changed appreciably between 1929 and 1933; that of the implements in group II was changed materially.

³ Not in production in 1933.

Source: International Harvester Co.

⁸ Since the figures compared represent annual averages, they combine into one figure for 1933 the wage rates both before and after the increases which were granted in July of that year.

⁹ Footnote 1 on p. 119 may explain this behavior of labor costs on the tractor plow.

TABLE 14.—*Changes in wage rates¹ and labor costs, International Harvester Co., 1933–37*

Implement	Plant at which produced	Wage rates	Labor cost
Group I: ²		<i>Percent</i>	<i>Percent</i>
Spring tooth harrow.....	Auburn.....	+41.3	+37.9
Cultivator.....	do.....	+41.3	+41.2
Tractor plow.....	Canton.....	+43.8	+25.8
Grain binder.....	McCormick.....	+49.0	+29.6
Corn binder.....	do.....	+49.0	+35.9
Farmall tractor ³	Farmall.....		
Side delivery rake and tedder.....	Rock Falls.....	+46.8	+27.9
Disk harrow.....	do.....	+46.8	+19.6
Group II: ²			
Mower.....	McCormick.....	+49.0	+34.2
Manure spreader.....	do.....	+49.0	+46.1
Hammer mill.....	do.....	+49.0	+6.3
Cream separator.....	Milwaukee.....	+53.0	+48.7
Grain drill.....	Richmond.....	+40.7	+13.6

¹ The wage rate figures are those paid all employees of the plant in which the implement is made, rather than to the wage rates of employees working only on the implement. Since the wage rate changes were all plant-wide, this should not affect the comparisons.

² The design of implements in group I was not changed appreciably between 1933 and 1937; that of the implements in group II was changed.

³ Not in production in 1933.

Source: International Harvester Co.

In the period 1933 to 1937, with the volume of output of agricultural implements increasing sharply, wage rates increased by a larger percentage than labor costs for all of the 12 machines for which comparable data were available, as shown in table 14. For the implements for which design was not greatly changed, the differences were rather marked, with wage rate increases in the several plants ranging from 41 to 49 percent and labor cost increases from 19 to 41 percent. (For the implements for which design and processes of manufacture changed, the variety of differences was even greater.) As in the case of the depression period, there is no simple explanation for the fact that labor costs did not increase as much as wage rates. Technological changes resulting in the improved efficiency of the labor force were probably responsible in part.¹⁰ In addition, there was apparently a reversal of the process noted above as characterizing the 1929–33 period; i. e., an increased efficiency of hourly workers and a return of piece workers to piece rates instead of hourly minima as production expanded.

When the changes over the period 1929–37 are compared in table 15, it is important to consider separately those machines and implements in which marked changes in design took place. In the five machines with substantial changes in design, wage rates and labor costs increased by approximately the same percentage on the mower and manure spreader; labor costs increased by a much larger percentage on the cream separator due to the substitution of stainless steel for carbon disks; and labor costs increased materially less than wage rates on the tractor and grain drill. As a matter of fact, labor costs on the tractor actually decreased 15.2 percent with a 21.5 percent increase in wage rates. This change was largely due to the introduction of the F-20 model to replace the regular Farmall tractor.

¹⁰ See ch. IV.

TABLE 15.—*Changes in wage rates¹ and labor costs, International Harvester Co. 1929-37*

Implement	Plant at which produced	Wage rates	Labor costs
Group I: ²		Percent	Percent
Spring tooth harrow.....	Auburn.....	+15.7	+18.7
Cultivator.....	do.....	+15.7	+20.1
Tractor plow.....	Canton.....	+17.8	-3.7
Grain binder.....	McCormick.....	+22.0	+13.2
Corn binder.....	do.....	+22.0	+20.0
Side delivery rake and tedder.....	Rock Falls.....	+20.2	+20.5
Disk harrow.....	do.....	+20.2	+6.5
Group II: ²			
Mower.....	McCormick.....	+22.0	+24.9
Manure spreader.....	do.....	+22.0	+20.1
Farmall tractor.....	Farmall.....	+21.5	-15.2
Cream separator.....	Milwaukee.....	+25.3	+47.7
Grain drill.....	Richmond.....	+15.2	+5.2

¹ Wage rate figures are for 1930 rather than 1929, but probably this is not important. (See text, p. 116.) They refer to the wage rates paid all employees of the plant in which the implement is made, rather than to the wage rates of employees working only on the implement. Since the wage-rate changes were all plant-wide, this should not affect the comparisons made.

² The design of implements in group II was not changed appreciably between 1929 and 1937; that of the implements in group I was changed.

Source: International Harvester Co.

On the other seven machines without substantial changes in design, wage rates and labor costs moved about proportionately on four machines while on the other three labor costs increased materially less than wage rates. Labor costs for the tractor plow actually decreased by 3.7 percent over this period in spite of 17.8 percent increase in wage rates.¹¹ Between 1929 and 1937, therefore, the typical machines studied in some detail can be almost equally divided between those for which wage rates and labor costs moved approximately in the same proportion and those machines on which wage rates increased considerably more than labor costs. Only on one machine, due to a change in design, did labor costs increase materially more than wage rates.

In summary, the experience of the International Harvester Co. with these 13 machines suggests that great care must be exercised in discussing the effect of changes in wage rates upon costs, profits, and prices of the company concerned, particularly in periods of greatly declining or expanding business. Labor costs on these machines neither declined nor advanced as markedly as wage rates.¹²

WAGE RATES, FACTORY COSTS, AND PRICES

For industry, the primary importance of changes in wage rates and in labor costs is their effect on the cost of making the product, and on the margin of profit. An industrial enterprise measures its success by profits on its operations as a whole. It is evident, however, that for purposes of management it must analyze the profitability of

¹¹ The company states that bad labor practice prevailed on this tractor plow in 1929 which was overcome by 1937.

¹² It is not intended to suggest by these conclusions that declines in wage rates must necessarily be accompanied by smaller declines in labor costs, or that there is any necessity for increases in wage rates to result in smaller increases in labor costs. It is merely that other influences, coincident in time with the wage rate changes, operated in these instances to diminish their effect on labor costs. Among these influences may be mentioned the varying possibilities of finding further technological means of offsetting the effect of higher wage rates and the ability and willingness of the company to make the additional capital investments necessary to realize these further savings.

each particular product and consider the price which the product will bring in the market. Decisions on wage rate changes are usually plant-wide or company-wide, but they affect profits and prices through their effect on the costs of individual products. For that reason, special attention has been given here only to an analysis of changes in direct labor costs per unit of output, in relation to changes in the total cost of making the individual product, to its price, and to the margin of profit which it yields. A small change in the cost of labor or materials required to produce a single unit may readily change a profit into a loss, if the margin of profit is small, although the change in cost may represent only a minor fraction of the total cost of producing the article.¹³

There has been much public discussion, particularly since 1930, of the effects which cuts in wage rates should have in reducing prices; and, when wages were raised after 1933, of the necessity for raising prices because of higher wage rates. In this discussion, there has been little available information on the effect of these wage-rate changes on labor costs, or on concurrent changes in total costs, including materials, overhead, etc.

In the interests of a more accurate appraisal of the cost factors in wage and price policy, the International Harvester Co. has made available a considerable body of information on the costs, "trading margins," and net realized prices of 13 typical machines, in 3 different years, 1929, 1933, and 1937. These years represent the post-war high of operation, the depth of depression, and the recovery peak of the 1930's, a period of exceptionally severe fluctuations in business, as indicated elsewhere in this chapter. Changes in the volume of business were particularly great for the agricultural implement industry. The value of agricultural implements produced for domestic sale declined by 80 percent between 1929 and 1933.¹⁴ By 1937 sales were 400 percent greater than in 1933. Since prices were raised, the increase in physical volume of production was somewhat less. As a consequence of these sharp swings in volume and of the large share of total costs of the Harvester Co. which are relatively fixed and must be allocated to whatever volume is produced—included in factory overhead costs and distribution expense—volume of production was the most important factor in unit costs and trading margins.¹⁵

During more normal years when volume of output does not fluctuate widely, small changes in labor and material costs would be relatively more important in affecting season's costs, price policies, and profits, than in such a period as 1929 to 1933 or 1933 to 1937. A comparison of the changes in costs and trading margins on 13 implements for the

¹³ This assumes that overhead remains the same. Of course, changes in the method of production may result in decreasing direct labor and materials cost but increasing overhead, and vice versa. It is the total cost which is important.

¹⁴ See p. 86.

¹⁵ Two points with respect to these fixed costs deserve mention. In the first place, factory overhead contains a number of items, largely labor, power, fuel, and light costs, which fluctuate fairly closely with volume of output. The decline in these costs is illustrated by a comparison between the ratio of depreciation to total factory overhead in 1929 and in 1933. Over this period the total amount of depreciation charged off did not change appreciably. However, other factory overhead costs declined so sharply that in one plant the importance of depreciation in total factory overhead costs increased fourfold. Secondly, depreciation has not been an important cost item, although the production of agricultural implements requires a large investment in plant and equipment. In a year of good business such as 1937, depreciation charges ranged for different plants of the company from 0.81 percent to 3.59 percent of the total cost of the output of the plant. In the depression year 1933 depreciation was of more importance ranging from nearly 29 percent of total cost of production in the Farmall plant to 2.57 percent of the Rock Falls plant. However, some additional elements of depreciation are included in materials costs when materials are produced by other units of the company. For additional data on these points see table IV, appendix B.

2 years 1929 and 1937, when volume of operations was high, illustrates this point, notwithstanding the adoption of new models and new processes during the period. It is also true, of course, that when volume is more stable, as it was in the years from 1923 to 1929, labor and material costs and prices are less likely to change substantially than in such periods as 1929-33 and 1933-37.

The great decline in volume from 1929 to 1933 resulted in a marked increase in unit costs for all of these machines, because of the smaller number of units to which factory overhead and distribution expenses could be charged. Conversely, in the period 1933 to 1937, when volume increased sharply, the unit cost of these implements declined.

The analysis of changes in costs for 13 typical machines, presented here, concerns four broad groupings in the company's costs—productive factory labor costs, materials costs, factory overhead costs, and distribution expenses.¹⁶ Since the analysis centers around season's factory labor costs for typical implements, it is important to emphasize that this item, as explained on page 116, by no means includes all of the actual labor cost involved in the manufacture and sale of the product, but merely the labor on the particular machine in the plant where the machine is completed. Thus, labor used in making parts in other plants of the company is charged here as "materials"; salaries of the factory office and supervisory staff and the unemployment and old-age insurance taxes of all employees in the plant are classed as "factory overhead"; and the salaries of the sales force, the staffs of the branch houses, and part of the central office are in "distribution expenses." The changes in productive labor cost percent described here do not cover all the pay rolls which would be affected by company-wide changes in wage rates.¹⁷

The change in each of the four cost elements listed above is compared with changes in the company's "trading margin." This is an accounting figure which is currently watched, as a gage by which the company measures the broad limits of the profit of an operation, and may be either a trading profit or a trading loss. It includes, in addition to net profit, several items of expense, such as provisions for certain reserves, income taxes, etc. A comparison is also made with changes in these three periods in the net realized price—that is, list price less estimated average discounts to dealers. The actual dollar figures underlying these changes (which are here shown in terms of the percentage of net realized price in tables 18 to 20) cannot be published

¹⁶ In this section, all changes in costs—labor, material, overhead, and distribution—represent changes in "seasons" or actual cost as defined in the appendix to chapter II. The labor cost figures do not include the labor in foundries which was included in the labor-cost figures used in the previous section. Materials costs include all purchases from other companies, all transfers of parts from other International Harvester Co. plants, and transfers of castings from the foundry of the plant in which the machine is assembled. Distribution expenses include the maintenance of the sales and service organization throughout the country, advertising, collection expenses, and bad-debt losses. The "net realized prices" have been estimated by the company. (See footnote 2, table 2, p. 88.) The price figures for 1937 are not precisely comparable with the wage rate, labor cost, and season's factory cost figures for that year. While all of these figures are averages for the entire 1937 "season," the net realized prices are based on the prices at the beginning of the season and hence do not take account of the price increases made in May of 1937. These came so late in the season, however, that the volume of sales affected was probably small.

¹⁷ Productive labor cost should not be confused with the company's total pay roll. For the International Harvester Co. as a whole, total pay rolls for all groups of salaried employees and wage earners averaged about one-third of its total expenses in the years 1929-38. Since it is an integrated company, some of these pay rolls are in the production and transportation of raw materials, i. e., iron ore, and the making of parts. It also purchases many parts for its machines, and this indirect labor cost—which appears here as "material"—also contributed, in an economic sense, to the making of implements. An unpublished study by Haskins & Sells, in 1923, tracing the indirect as well as the direct labor used in making agricultural implements, estimated that labor as a whole comprised 80 percent of the value of output. Because of the important role of purchased materials, in which there is also labor cost, company officials are concerned with general movements of wages in other branches of manufacturing, which may later affect their operations indirectly through prices of purchased materials or parts.

because of their confidential character; however, they were made available for examination by representatives of the Bureau of Labor Statistics.

The course of events during the period 1929-37 can best be illustrated by two hypothetical cases—in which assumed net realized prices within the general range of the actual figures, but not the actual ones—are used to illustrate the magnitude of actual changes in various cost and profit items. For the spring tooth harrow, for example, a net realized price to the company of \$25 in 1929 is assumed.¹⁸ The decline in that net realized price from 1929 to 1933 was \$1.43. Productive factory labor costs went down 39 cents—reflecting reductions of 18.1 percent in wage rates. At the same time, "season's" material costs as calculated by the company increased by \$1.08.¹⁹ Because of the great reduction in volume of sales, and hence in the number of units to bear the burden of fixed costs, factory overhead chargeable to each spring tooth harrow went up by \$4.68, and distribution expenses went up by \$5.29. The net effect of all these changes was to reduce the trading margin by \$12.09, i. e., from a trading profit of \$5.70 to a trading loss of \$6.39.

Similar changes—with minor variations—appear in the case of the tractor plow, which is assumed to have brought the company a net realized price of \$90 in 1929. Here, net realized prices went up slightly, by \$1.12, but factory labor costs declined by \$3.28, and material costs²⁰ by 66 cents for each tractor plow. Because of greatly reduced volume, factory overhead advanced by over \$25 per unit and distribution expense by nearly \$23. The trading margin, as in the case of the spring-tooth harrow, was reduced by about \$43, i. e., from a trading profit of over \$15 to a trading loss of nearly \$28.

In the recovery period from 1933 to 1937, when volume was increasing, the situation was reversed. Again hypothetical net realized prices are assumed for these two typical implements—of \$23.57 on the spring-tooth harrow and \$91.12 for the tractor plow.²¹ Wage rates of the employees of the Auburn plant, which makes the spring-tooth harrow, increased by 41.3 percent. As shown in the foregoing discussion, changes in wage rates do not necessarily involve proportionate changes in labor costs. In this particular case average productive factory labor costs for each spring-tooth harrow actually increased by 91 cents. Material costs increased by 38 cents per harrow. Factory overhead and distribution expenses per unit decreased by \$3.32 and \$5.01, respectively. During this period, the net realized price of the harrow advanced by a hypothetical figure of \$3.70. Taken together, these changes resulted in an increase in the trading margin of \$10.74, that is, a change from a loss of \$6.40 to a trading profit of \$4.34, in contrast with a decline from 1929 to 1933 of \$12.09, that is from a trading profit of \$5.70 to a trading loss of \$6.39. Thus, the enhanced possibilities for profitable operation—not indicated solely by the "trading margin" (which, it should be remembered, includes some expenses and is not equivalent to net profit)—grew largely out of reduced overhead and distribution, plus the increase of \$3.70 in net realized price, which more than offset slightly higher direct labor and material costs.

¹⁸ See table 16.

¹⁹ Note that this includes certain items of labor and overhead, as well as losses on inventories. For a discussion of this subject see p. 87.

²⁰ Note that this includes certain items of labor and overhead, as well as losses on inventories. For a discussion of this subject see p. 87.

²¹ As calculated from the assumed 1929 price. See table 16.

TABLE 16.—*Changes in net realized prices, costs and trading margins per unit, 1929-33 and 1929-37*[Dollar changes based on assumed net realized price in 1929]¹

Implement and assumed net realized price in 1929	Plant in which produced	Net realized price	Productive factory labor costs	Material costs ²	Factory overhead costs ²	Distribution expenses ²	Trading margin ³
1929-33							
Spring-tooth harrow, \$25.....	Auburn.....	-\$1.43	-\$0.39	+\$1.08	+\$4.68	+\$5.29	-\$12.09
Tractor plow, \$90.....	Canton.....	+1.12	-3.28	- .66	+25.02	+22.94	-42.90
1929-37							
Spring tooth harrow, \$25.....	Auburn.....	+2.25	+ .52	+1.45	+1.36	+ .28	-1.36
Tractor plow, \$90.....	Canton.....	+10.09	- .52	+2.09	- .72	- .51	+8.73

¹ The dollar changes shown correspond to the percentage changes for these implements shown in tables 17 and 19, an assumed approximate net realized price in 1929 having been substituted for the actual net realized price used as the basis for computing the percentages shown in those tables.

² Contains items of labor costs, certain items of overhead on interplant transfers and, at times, changes in inventory valuation.

³ May be either trading profit or trading loss. Changes in trading margins per unit are not necessarily related closely to changes in net profits of the company. (See text, p. 123.)

Source: International Harvester Co.

TABLE 17.—*Changes in net realized prices, costs, and trading margins per unit, 1933-37*[Dollar changes based on assumed net realized price in 1933]¹

Implement and assumed net realized price in 1933	Plant in which produced	Net realized price	Productive factory labor costs	Material costs ²	Factory overhead costs ²	Distribution expenses ²	Trading margin ³
Spring-tooth harrow, \$23.57.....	Auburn.....	+\$3.70	+\$0.91	+\$0.38	-\$3.32	-\$5.01	+\$10.74
Tractor plow, \$91.17.....	Canton.....	+8.96	+2.75	+2.74	-25.75	-22.45	+51.67

¹ The dollar changes shown correspond to the percentage changes for these implements shown in table 18, an assumed approximate net realized price in 1933 having been substituted for the actual net realized price used as the basis for computing the percentages shown in that table.

² Contains items of labor costs, certain items of overhead on interplant transfers, and at times, changes in inventory valuation.

³ May be either trading profit or trading loss. Changes in trading margins per unit are not necessarily related closely to changes in net profits of the company. (See text, p. 123.)

Source: International Harvester Co.

At the Canton plant, at which the tractor plow is made, an increase of 43.8 percent in wage rates paid resulted in a \$2.75 increase in productive factory labor costs for each tractor plow. Material costs increased by \$2.74. These increases were small compared to the decrease of \$25.75 in factory overhead costs per unit, and in distribution expenses of \$22.45, resulting from the increased number of units sold in 1937. Net realized prices were increased \$8.96. The results of all these changes were reflected in the trading margin which rose \$51.67 (from a trading loss of \$27.75 to a trading profit of \$23.92) as compared with a decline of \$42.90 (from a trading profit of \$15.20 to a trading loss of \$27.70) from 1929 to 1933.

In interpreting these figures, it should be emphasized that these changes in trading margin relate to each unit produced. The actual profit realized on any particular line depends not only upon unit trading margin but also upon the number of units sold.

Because of the overwhelming effect of volume on operations in these years, the comparison of the year 1929 with 1937—both good business years—presents a quite different picture. This comparison is not

entirely satisfactory because of the changes in design and methods of production which took place over the 9-year period. Comparative costs for these 2 years are shown in table 16 for the spring-tooth harrow and the tractor plow, on the same hypothetical prices, to which actual percent changes in certain cost items have been related. The outstanding feature of this comparison is the relative absence of change over this long period. Productive labor costs increased slightly—52 cents for the harrow, and declined slightly by 52 cents for the tractor plow. Wage rates, meanwhile, are estimated to have increased 15.7 percent in the Auburn plant making the spring-tooth harrow, and by 17.8 percent in the Canton plant making the tractor plow. The cost of materials and purchased parts, in the same period advanced by \$1.45 for the harrow and by \$2.09 for the plow—the largest group of changes in costs. Factory overhead was up by \$1.36 for the harrow and down by 72 cents for the plow—both relatively slight changes compared with those in the shorter periods. Distribution costs averaged about the same in the 2 years. In these circumstances, the increase of \$2.25 in net realized price for the spring-tooth harrow left a somewhat smaller trading margin (\$1.36 lower) than in 1929. For the tractor plow, an advance of \$10.09 in net realized price gave a trading margin larger by \$8.73 per plow. Again, the significance of these changes in trading margin must be appraised in the light of concurrent changes in volume and it should not be assumed that the narrower margin on the spring-tooth harrow necessarily implies a smaller total profit on the line.

These two examples, both hypothetical, serve to illustrate the role of various costs and their relation to price. They are not typical in certain respects, since the tractor plow—the most important implement in terms of sales volume of those for which a full record was secured—showed a somewhat greater increase in net realized price and trading margin between 1929 and 1937 than other implements. Changes illustrated by the spring-tooth harrow were more typical.

In general, however, the picture for the 13 implements is the same. On the basis of the changes over these periods in the season's costs, prices and trading margins of the other implements for which few changes in design were made (classed in group I), certain more general statements can be made. Between 1929 and 1933 the increase in distribution expenses per unit was in nearly every case larger than the increase in factory overhead costs per unit. The methods of distribution used by this company—through its own branch houses—make it difficult to cut distribution costs when there is any extensive decline in volume. For example, if the company distributed through jobbing concerns, the latter, instead of International Harvester Co., would be burdened in depressions with the fixed expenses of maintaining wholesale distribution warehouses and sales organizations, although in ordinary years it is a more economical method of distribution for the company. This is a highly important factor in the cost structure of the company.²²

From 1933 to 1937, although market prices of materials were rising, the dollar increases in material costs charged to each machine in the company's season's cost calculations for each implement in the same

²² See table 18.

group (group I), were as small as or smaller than the increases in productive factory labor costs, although the latter increased only slightly in comparison with large changes in overhead and distribution costs, prices, and trading margins. The period 1933-37 was characterized by a marked general upward trend in wages throughout American industry as a whole, such as company executives hold to have important effects on their costs. Such Nation-wide changes usually occur concurrently with changes in their own wage rates. It may also have been true that in other companies, as in the Harvester Co., wage-rate increases did not, as a rule, cause equivalent increases in labor costs, and these increases in labor costs were offset by the reduction in unit overhead and distribution expenses which accompanies an expansion in the volume of output²³ such as occurred between 1933 and 1937.²³ It must be borne in mind, however, that the company was operating at a loss in 1933 and at a profit in 1937.

Between 1929 and 1937 it was also true of other implements in this group (group I), as it was of the tractor plow and the spring-tooth harrow, that the changes in season's costs, prices, and trading margins were surprisingly small.²⁴

For the five implements in group II which were radically changed in design, it is difficult to make a valid comparison of season's costs, prices, and trading margins between 1933 and 1937, and more importantly, between 1929 and 1937. Price changes vary more widely and the changes in trading margins are very different where changes in design are made, and cannot readily be interpreted.

TABLE 18.—*Changes in net realized prices, costs, and trading margins per unit 1929-33, for selected implements*

[Dollar changes expressed as a percentage of the 1929 net realized prices]

Implement	Plant at which produced	Net realized price	Productive factory labor costs	Material costs ¹	Factory overhead costs ¹	Distribution expenses ¹	Trading margin ²
Group I: ³		<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Spring-tooth harrow.....	Auburn.....	-5.7	-1.55	+4.31	+18.70	+21.17	-48.39
Cultivator.....	do.....	-3.1	-2.13	+5.72	+22.14	+23.18	-51.97
Tractor plow.....	Canton.....	+1.3	-3.64	-.73	+27.80	+25.49	-47.67
Grain binder.....	McCormick.....	-5.6	-2.31	-2.01	+15.04	+22.78	-39.06
Corn binder.....	do.....	-6.2	-2.21	-.82	+15.64	+22.50	-41.36
Manure spreader.....	do.....	-4.5	-2.79	+ .98	+12.00	+22.66	-37.32
Farmall tractor ⁴	Farmall.....						
Side delivery rake and tedder.....	Rock Falls.....	-6.0	-.53	+2.04	+22.78	+22.12	-52.43
Disk harrow.....	do.....	-6.4	-.95	+2.21	+18.15	+21.70	-47.53
Cream separator.....	Milwaukee.....	-12.8	-.11	+ .11	+35.56	+14.09	-62.47
Group II: ³							
Mower.....	McCormick.....	-6.1	-1.35	+2.05	+15.25	+22.57	-44.59
Grain drill.....	Richmond.....	+4.7	-1.53	+18.15	+50.82	+26.44	-89.22

¹ Contains items of labor costs, certain items of overhead on interplant transfers, and losses on inventory valuation, since market prices of materials were declining during this period.

² May be either trading profit or trading loss. Changes in trading margins per unit are not necessarily related closely to changes in net profits of the company. (See text, p. 123.)

³ The design of implements in group I was not changed appreciably between 1929 and 1933; that of the implements in group II was changed.

⁴ Not in production in 1933.

Source: International Harvester Co.

NOTE.—All cost figures are season's or actual costs.

²³ See table 19.

²⁴ See table 20.

TABLE 19.—*Changes in net realized prices, costs, and trading margins per unit, 1933-37 for selected implements*

[Dollar changes expressed as a percentage of the 1933 net realized prices]

Implement	Plant at which produced	Net realized price	Productive factory labor cost	Material costs ¹	Factory overhead costs ¹	Distribution expenses ¹	Trading margin ²
Group I: ³		<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Spring tooth harrow.....	Auburn.....	+15.7	+3.87	+1.59	-14.08	-21.26	+45.55
Cultivator.....	do.....	+9.9	+5.14	- .19	-15.60	-23.64	+44.14
Tractor plow.....	Canton.....	+9.8	+3.02	+3.01	-28.25	-24.62	+56.67
Grain binder.....	McCormick.....	+3.2	+5.00	+3.91	-12.84	-25.56	+32.69
Corn binder.....	do.....	+10.4	+6.35	+1.52	-11.87	-24.55	+38.92
Side delivery rake and tedder.....	Rock Falls.....	+14.6	+2.52	+1.35	-22.09	-23.13	+55.91
Disk harrow.....	do.....	+9.0	+1.63	- .66	-18.76	-23.49	+50.28
Group II: ³							
Mower.....	McCormick.....	+17.1	+6.67	+3.08	-12.04	-23.59	+42.99
Manure spreader.....	do.....	+12.0	+6.19	+1.47	-8.33	-23.39	+36.08
Hammer mill.....	do.....	+17.7	+1.25	-.07	-23.83	-23.52	+63.83
Cream separator.....	Milwaukee.....	+10.9	+8.57	+2.11	-28.38	-23.12	+51.68
Grain drill.....	Richmond.....	+14.0	+2.49	-15.09	-48.80	-23.38	+98.82

¹ Contains items of labor costs, certain items of overhead on interplant transfers, and any changes in inventory valuation.² May be either trading profit or trading loss. Changes in trading margins per unit are not necessarily related closely to changes in net profits of the company. (See text, p. 123.)³ The design of implements in group I was not changed appreciably between 1929 and 1937; that of the implements in group II was changed.⁴ Farmall tractor omitted; not in production in 1933.

Source: International Harvester Co.

NOTE.—All cost figures are season's or actual costs.

Taking the entire group of 13 implements as a whole over these years, 1929-37, there appears to have been no close relationship between the changes in net realized prices and those in costs. There are instances where changes in price were in an opposite direction to changes in unit labor costs. This emphasizes the observation that although changes in labor costs are often given as the reason for price changes, changes in other costs and in the competitive situation in the market for a particular implement will be found to be the more important factors in the final consideration of a change in price.

TABLE 20.—*Changes in net realized prices, costs, and trading margins per unit 1929-37, for selected implements*

[Dollar changes expressed as a percentage of the 1929 net realized prices]

Implement	Plant at which produced	Net realized price	Productive factory labor cost	Material costs ¹	Factory overhead costs ¹	Distribution expenses ¹	Trading margin ²
Group I: ³		<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Spring tooth harrow.....	Auburn.....	+9.0	+2.09	+5.80	+5.44	+1.14	-5.44
Cultivator.....	do.....	+6.5	+2.86	+5.53	+7.01	+ .26	-9.19
Tractor plow.....	Canton.....	+11.2	-.58	+2.32	-.80	+ .57	+9.70
Grain binder.....	McCormick.....	-2.5	+2.41	+1.68	+2.92	-1.36	-8.19
Corn binder.....	do.....	+3.5	+3.75	+ .60	+4.52	- .51	-4.88
Side delivery rake and tedder.....	Rock Falls.....	+7.7	+1.84	+3.32	+2.02	+ .38	+ .13
Disk harrow.....	do.....	+2.0	+ .57	+1.59	+ .59	- .28	- .47
Group II: ³							
Mower.....	McCormick.....	+10.0	+4.91	+4.94	+3.94	+ .41	-4.22
Manure spreader.....	do.....	+7.0	+3.13	+2.38	+4.04	+ .31	-2.86
Farmall trac or.....	Farmall.....	+4.0	-2.28	+ .52	+ .08	- .16	+5.83
Cream separator.....	Milwaukee.....	-3.3	+7.37	+1.95	+10.81	-6.06	-17.42
Grain drill.....	Richmond.....	+19.4	+1.08	+2.36	- .26	+1.97	+14.21

¹ Contains items of labor costs, certain items of overhead on interplant transfers, and any changes in inventory valuation.² May be either trading profit or trading loss. Changes in trading margins per unit are not necessarily related closely to changes in net profits of the company. (See text, p. 123.)³ The design of implements in group I was not changed appreciably between 1929 and 1937; that of the implements in group II was changed.

Source: International Harvester Co.

NOTE.—All cost figures are season's or actual costs.

This analysis again emphasizes the outstanding importance of volume to the Harvester Co. or any firm making durable goods, such as farm implements. In the hypothetical illustration given here, so great is the influence of volume that even if all labor used by the company on the tractor plow in the Canton plant and in its other plants had been donated in 1933, or if material prices had fallen as much as 75 percent, the company would still have had a "trading loss" on this implement. Such conditions are highly improbable, of course, but they serve to dramatize the fact that the key to profitable operations is volume of production. In considering wage policy in periods of such cataclysmic decline as 1929-33, it is clear that even a drastic reduction of wage rates for all employees cannot convert a loss on total operations into a profit. The paramount consideration, following this analysis, appears to be ways and means of increasing volume, not only because of overhead and distribution costs but because of the reductions in employment which accompany reduced volume. The broad aspects of this subject of sustained employment were beyond the scope of this inquiry in the International Harvester Co., but the company states that—

During 1932 and 1933, as volume declined, the company was compelled to not only reduce wages and salaries but to reduce employment drastically in meeting its depression problems. In the case of those regular employees who had been in the employ of the company five years or more, the company studied the individual situations of each of these employees to find all cases of economic distress, with the result that a program of assistance was instituted. A company-financed loan project was instituted which made small loans totalling a million dollars. The company also instituted what was known as a make-work program and a spread-work program, both of which returned employees to its pay roll. The former program consisted of manufacturing machines for which there was sure to be a demand when economic recovery came. While this started out as a human relations program, its ultimate results were eventually of economic benefit to the company because it provided an inventory of machines with which to meet the rapid increase in demand which later occurred. Moreover, additional machines were not only manufactured at reduced labor and material costs but they also reduced the unit overhead cost of all machines manufactured during the depression.

In a period of severe depression, a company in an industry of this character may operate at a loss despite all the economies it can practicably make in direct costs of labor and materials. Since wages and salaries and materials in all branches of the company's operations are the principal cash expenditures, they represent practically the only opportunities for instituting economies. Continued losses put pressure on management to cut wages, to purchase materials more cheaply, to reduce expenses of distribution, and so forth, in order to reduce losses, and to maintain liquidity. Total costs per unit of output, as distinct from the sum of the company's expenditures, are higher in depression than at any other time.

During recovery, on the other hand, when volume is increasing sharply, as between 1933 and 1937, current unit costs will decrease despite increases in wage rates or in material costs. In more normal times when volume does not fluctuate widely from year to year changes in labor costs or in any of the other elements in cost may make a difference between profit and loss per unit of output.

APPENDIX TO CHAPTER III

HISTORY OF EMPLOYEE ORGANIZATION IN THE INTERNATIONAL HARVESTER CO.

The International Harvester Co. offered to its employees in 1919 a plan of employee representation, known as the Harvester Industrial Council plan. It provided for joint representation of employees and management in works councils at those works in which the plan was adopted by majority vote of the employees. At most works the plan was approved and put into effect immediately. It provided that the manager of industrial relations of the company, someone designated by him, or a vice chairman elected from the council group (almost always a representative of management) act as chairman of the council meeting. A secretary was appointed by the plant superintendent. The works councils concerned themselves with questions of policy relating to working conditions, health, safety, recreation, education, hours of labor, and wages. The scope of their activity varied considerably from plant to plant.

As affecting wages, article XIX of the council plan provided—
decisions * * * made by any works council or general council or by arbitration, shall be subject to revision whenever changed conditions justify but not oftener than by intervals of 6 months.

From the minutes of the Fort Wayne Council, it would appear that the council was not primarily concerned with wage negotiations and relatively little time was given to discussions of wage problems. "Thus since 1927 the elected representatives made only one request for a beneficial change in wages and hours."¹ The executives of the International Harvester Co., however, call attention to the finding of the National Labor Relations Board that—

Many matters handled by the employee representatives are settled without the necessity of their taking them to the superintendent or to the works council. The majority of individual grievances presented by employees to their representatives are generally adjusted by the latter through contact with the appropriate foreman or assistant foreman. These grievances involve such matters as individual rates of pay, working conditions, shifts, transfer, etc.²

These works councils continued in operation throughout the period of the depression, the National Recovery Administration, and after the passage of the National Labor Relations Act, until the spring of 1937. In November 1936, the National Labor Relations Board ordered the disestablishment of the Fort Wayne Works Council, but the company appealed this ruling to the Federal circuit court.³

¹ See the order of the National Labor Relations Board of November 12, 1936, p. 27, case No. C-41.

² *Ibid.*, p. 116.

³ In March 1936, a complaint had been filed against the company by the National Labor Relations Board following allegations of Local No. 57 of the United Automobile Workers Association that the works council organization in the Fort Wayne plant was in violation of the Wagner Act. In brief, the complaint charged the company with interference with a labor organization and contribution of financial and other support to it. After 2,000 pages of testimony, the Board ordered, in November 1936, the company to—

"(a) Withdraw all recognition from the Harvester Industrial Council plan at the Fort Wayne plant for the purpose of dealing with grievances, labor disputes, wages, rates of pay, hours of employment, or conditions of work, completely disestablish the Harvester Industrial Council plan as representing its employees at Fort Wayne;

"(b) Post notice to this effect for 30 days."

The company appealed the ruling of the Board to the Federal circuit court, but formally withdrew the appeal on December 21, 1937.

Immediately after the Jones-Laughlin Steel Co. decision of April 12, 1937, the president of the International Harvester Co. wrote a letter to all employees announcing that—

With the greatest regret the management has come to the conclusion that it should no longer deal for collective bargaining purposes with the representatives of employees elected under the "Harvester Industrial Council Plan" at all works of the company in the United States. * * *

With the works council form of collective bargaining now discontinued, what lies ahead? This is for the employees to determine for themselves and each employee has his own individual right of free choice guaranteed to him by the National Labor Relations Act. * * *

The management will continue its past policy of meeting and dealing with individual employees or with the authorized representatives of any groups who wish to discuss any matters of concern to them. In the future, however, these relationships will be limited so far as required to conform with that section of the National Labor Relations Act which provides that the representatives of a majority of the employees in any "appropriate unit" (as determined or approved by the National Labor Relations Board) shall be the exclusive representatives of all the employees in such unit for the purposes of collective bargaining in respect to rates of pay, wages, hours of employment, or other conditions of employment.

Following the disestablishment of the works council plan, collective-bargaining agencies were organized by the employees in most of the company's plants and the company is now dealing with collective-bargaining agencies in 17 of its 20 United States plants (including coal and iron mines). In 6 of these plants the collective-bargaining agency has been certified by the National Labor Relations Board after consent elections. In 3 of these elections—at tractor works, iron mines, and Huntington Park works—the unions affiliated with the Congress of Industrial Organizations were certified as representing the majority of the employees. In the other 3 elections—at Springfield works, Fort Wayne works, and the coal mines—local independent unions were certified by the National Labor Relations Board. In a second consent election recently held in the coal mines, the Progressive Miners of America were certified as the collective-bargaining agency. In addition to the plant-wide bargaining carried on with these groups, the company is also dealing with certain skilled trades affiliated with the American Federation of Labor in 3 of the plants in which general collective-bargaining agreements are in effect. In all but 2 of the 17 plants in which there are collective-bargaining agencies, written contracts have been negotiated and signed by the company and the bargaining agency. On June 5, 1939, upon charges of the Farm Equipment Workers Organizing Committee, the National Labor Relations Board issued a complaint against the company charging that the 6 unions at Rock Falls, McCormick, East Moline, West Pullman, Farmall, and Milwaukee works had been instigated by the company and were in violation of the Wagner Act. The hearings before a trial examiner were concluded on October 5, 1939, and no intermediate report has yet been issued.

A comparison of the agreement signed by the plant superintendent of the Farmall works with the United Motor Power Association, an independent union, and the agreement signed by the plant superintendent of the tractor works in Chicago with an affiliate of the Congress of Industrial Organizations, indicates that the chief differences pertained to seniority clauses. Both of these plants produce the same product—tractors. The Congress of Industrial Organizations contract provided very detailed arrangements by which seniority was to

be determined for lay-offs and hirings. The independent union contracts provided for plant-wide seniority, while the Congress of Industrial Organizations contract provided for a modified departmental seniority. In the Congress of Industrial Organizations contract, seniority rights were not secured until after 12 months of probationary employment, while under the independent contract 6 months had to elapse before seniority rights were earned. A further minor difference in the contracts was the detailed enumeration of causes for dismissal in the independent union contract.

In the view of the company as expressed in explicit statements of officials, and as indicated by an analysis of various policies of the company, the company has for many years shown itself willing to recognize the desirability of dealing with the wage earners in an organized fashion. Recognizing the inequality in the bargaining position of the company and that of the individual workmen, it sponsored the organization of works-councils in 1919. The works-council plan was one of the first of its type and is regarded by impartial observers as having been one of the most satisfactory ones. It is probably correct to say that officials of the company would have preferred to have had the works-council method of representation continued. The plan was in operation some 19 years and the company is proud of the record of no strikes during this period.

CHAPTER IV

CHANGES IN TECHNOLOGY

The prosperity of the durable-goods industries and their employees is largely dependent upon decisions by business executives to spend money for new plant and equipment. These industries are so important in the national economy and the fluctuations in their rate of activity have such a pronounced effect upon the business cycle that the prosperity of the whole country is bound up with their activity. Technological changes which result in improvements in the usefulness of the product or in reductions in its cost and price give consumers the benefit of modern scientific knowledge, and the rate at which the discoveries of scientists and engineers are introduced is consequently a matter of public interest. The rate of technological change is of immediate concern to the wage earner whose job may be abolished or drastically modified by investments in new machinery and equipment, and numerous studies have described the nature of the changes in industrial techniques and processes which modern machinery has achieved, the increased productivity of the working force which has resulted, and the displacement in many industries of workers by machines. Although the importance of expenditures for new plant and equipment has been examined from numerous angles, little attention has been given to the way in which executives in particular companies arrive at their decisions on appropriations for this purpose.

This chapter is concerned with the factors influencing decisions in the International Harvester Co. to introduce technological changes—the location of responsibility for these decisions, some of the assumptions underlying the decisions reached, and the data available to executives when proposals are under consideration. Some attention is given to the importance of higher wage rates as stimulants to technological change. It further attempts to discover whether the conclusion in the preceding chapter that labor costs have increased less rapidly than wage rates for certain typical products of the Harvester Co. can be accounted for in part, at least, by the adoption of technological changes which increased the efficiency of the workers by providing them with improved machines and better tools. Since corporation accounting records are not primarily designed to provide statistical answers to economic questions of this character, the answers cannot be conclusive.

In considering technological changes in the International Harvester Co., the term has been interpreted broadly to include any changes in equipment, in methods of production or in the product, except for those changes which originated outside of the International Harvester Co. The distinction between changes that originate within the company and those which are passed on to it by its suppliers of raw materials and parts is important. Better plows and tractors can be produced because better steel is supplied by firms producing steel, but

this study is almost entirely confined to those changes which originated within the International Harvester Co.

Among the changes which this study has taken into account are those made in the methods of producing substantially the same product as well as those which are primarily directed to changing the product itself. The replacement of a cutting or stamping machine by a superior one is illustrative of the former; strengthening a part of a product is an example of the latter. Some changes involve both a change in product and in the method of production.

Since a study of the technological changes which affected the production of each of the 13 machines discussed in the preceding chapter was beyond the scope of this inquiry, a single machine—the F-20 tractor—was selected for detailed examination. This is manufactured primarily in the Farmall plant.¹ Some of the procedures described below also apply, of course, to other parts of the company's operations.

Technological changes in the International Harvester Co. are originated in the main by the engineering and manufacturing departments and passed upon by the managers of these departments and other executives. Special "cost-reduction committees" in each plant and "product committees" in the general office have been set up with the major responsibility of developing suggestions for bettering methods and machines.

Minor changes which do not involve large expenditures are authorized by the works manager, or by the engineering and manufacturing department in "letters" sent to the works involved.² More important changes are authorized by "decisions" of these departments, to which are appended estimates of changes in cost resulting from the "decision." Changes in design are carefully studied by the sales department to determine their probable effect on consumers.

If the expenditure of a substantial sum of money for new plant or equipment is involved, the appropriation is brought before the executive council before being approved by the President. Amounts over a designated sum must also have the approval of the board of directors.

Most appropriations are, of necessity, adopted without any precise advance estimate of the "savings" which they will bring about.³ The factors which will determine the volume of savings are too uncertain to be used as the basis for a calculation with any pretense to accuracy. Appropriations of this character may be classified into those for "increased production and expansion," "new products and changes in models," "improved plant facilities," and "replacements."

There are certain types of appropriations, however, for which detailed estimates of the "savings" anticipated from their adoption can be made. Usually this is only possible when an improved machine is being substituted for old equipment without any general changes being made in either the product or the method of production.

These are, of course, not the only appropriations which reduce costs. Rather, they are the only ones on which separate estimates of savings were possible because they were introduced at a time when no major changes, such as changes in models, were being made. All of

¹ Some of the parts are made elsewhere. This model was an important item in the company's line of machines from the time it was introduced in 1934, replacing the "regular Farmall," until the company introduced its new line of general purpose tractors in 1939.

² Known in the company as "gas-power change letters" or, more briefly, as "G. P. C. letters."

³ See pp. 134-135 for an explanation of the special sense in which the word "savings" is used here and in the discussion which follows.

the new equipment purchased at times of model changes is, in the judgment of executives, the most efficient and economical then available, considering the processes and volumes of production involved, and its introduction is undoubtedly responsible for substantial reductions in costs.

The appropriations made at the Farmall works, where tractors are manufactured, during the period 1930-39, have been classified according to type, as follows:⁴

	Amount	Percent
Appropriations for which savings could not be calculated:		
For new products and changes in models.....	\$7,336,689.04	71.3
For increased production and expansion.....	1,769,151.00	17.2
For improved plant facilities.....	458,076.00	4.5
For replacements.....	192,394.20	1.9
Appropriations for which savings were calculated.....	528,790.00	5.1
Total.....	10,285,100.24	100.0

TABLE 21.—Summary of appropriations for Farmall plant, seasons 1930-39

Year	Appropriations on which estimates of specific "savings" were not available at time of granting				Appropriations on which estimates of specific "savings" were available at time of granting	
	Buildings, machinery, and equipment				Amount	Estimated annual "savings"
	For increased production and expansion	For new products and changes in models	For improved plant facilities	For replacements		
1930.....	\$302,000	\$17,125.00	\$172,900	-----	\$2,000	\$5,040.00
1931.....	23,200	437,503.00	14,650	-----	5,890	3,917.00
1932.....	1,266	15,470.00	-----	\$6,870.00	2,650	2,610.00
1933.....	-----	1,650.00	1,417	1,850.00	10,900	20,575.64
1934.....	325,500	51,886.04	27,129	3,100.00	80,640	94,960.00
1935.....	17,950	343,025.00	68,775	20,950.00	61,900	68,853.80
1936.....	73,025	7,350.00	76,900	77,300.00	160,160	124,027.80
1937.....	1,020,210	63,233.00	67,230	33,750.00	180,260	326,059.40
1938.....	-----	61,900.00	2,475	-----	3,400	7,717.50
1939.....	6,000	6,337,547.00	26,600	48,574.20	20,990	68,140.00
Total appropriations for Farmall plant, 1930-39.....	1,769,151	7,336,689.04	458,076	192,394.20	528,790	719,931.14
	\$10,285,100.24				-----	-----

Source: International Harvester Co.

Of the total of over \$10,250,000 expended at Farmall during this period, 88 percent was expended for expansion or for model or product changes and, together with expenditures for various other improvements, made a total of nearly 95 percent for which "savings" could not be calculated in advance. Thus the detailed analysis in this chapter relates to a very small share—5 percent—of all appropriations.

There are obvious limitations, in the opinion of company officials, to the soundness of estimates of "savings" on their investments since net effect of the new investment alone on subsequent profits cannot be isolated. If the manufacturing facilities and the products of the company are not kept up to date, the volume of business and the profits of the company as a whole will suffer. On the other hand, the new investment cannot be considered as alone responsible for the

⁴ See table 21.

"savings" which follow, as they are only made possible by the coordinated activity of the whole existing manufacturing and distributing facilities and organization of the company.

APPROPRIATIONS FOR WHICH "SAVINGS" WERE CALCULATED

During the period 1930-39, as already indicated, about 5 percent of the funds appropriated for the Farmall plant were of such a nature as to permit an estimate of anticipated "savings" to be made. Such requests arise primarily from the "cost-reduction program" of each works centering around the committees mentioned in the preceding section. From 6 months to 2 years after the appropriations were made, reports on actual savings are prepared by the works for the accounting department of the general office. These records permit a comparison between the "savings" that were expected and those actually realized.

The way in which the estimated "savings" submitted with the request for an appropriation are calculated is of some interest. The labor and materials costs per 100 parts, currently and with the new equipment, are calculated, and the difference multiplied by a production figure for the part in question. This production figure is sometimes that of the last season, and sometimes the expected current season's production. Estimated "savings" made in labor costs, when a man not working at piece rates is displaced, are sometimes based on his wages for a 52-week year but sometimes those for a 32-, 48-, or 50-week year are used, depending on the current rate of operations. From this gross "savings" 6 percent of the capital outlay, including installation charges, is deducted for depreciation, leaving the estimated "net savings" effected in a given year by the appropriation.⁵

The following calculations from the report on appropriations Nos. 14542 and 14780 of May 15, and October 12, 1936, for machine and tooling equipment to manufacture redesigned starting-crank knuckles and shafts illustrate the method of calculating these "net savings." Under the old process, knuckles were made from malleable castings and pinned to the shaft, but under the new they are made from hot-rolled steel and projection welded to a cold-rolled shaft.⁶

	Materials	Labor	Total
Old-process costs per 100 pieces.....	\$42. 87	\$17. 23	\$60. 10
New-process costs per 100 pieces.....	30. 84	16. 50	47. 34
Gross savings per 100 pieces.....	12. 03	. 73	12. 76

$\$12.76 \times \frac{45,040}{100}$ (1937 production estimate).....	\$5,747. 10
Less 6-percent depreciation on \$4,534.49	272. 07
Net savings.....	5,475. 03

¹ The cost of purchase and installation of the new equipment.

⁵ This low rate of depreciation should be considered in conjunction with the practice, later described, of expecting savings to compensate for certain capital expenditures within a period of 2 years. Consequently the 6-percent rate really represents little more than an allowance for interest on investment and is in no sense full depreciation.

⁶ Additional examples of savings estimates are given in appendix C.

The specialized meaning of "savings" must be noted. The volume of "savings" effected is greatly influenced by the volume of production—the larger the production the larger the "savings" from an appropriation. Furthermore, the "savings" expected from an appropriation are calculated for only 1 year rather than over the expected life of the machine. Thus it might be expected that appropriations of this character would be made most frequently when production is largest; that is, in a period of peak activity.

A comparison of the amount of these appropriations with the estimated "savings" to be effected shows that most such appropriations are expected to "pay for themselves" in less than 2 years.

TABLE 22.—*Comparison of appropriations and savings in the Farmall plant, 1930–37*

Year	Appropriations on which estimates of specific savings were calculated	Estimated annual savings	Actual savings
1930.....	\$2, 000	\$5, 040. 00	-----
1931.....	5, 890	3, 917. 00	-----
1932.....	2, 650	2, 610. 00	-----
1933.....	10, 900	20, 575. 64	-----
1934.....	80, 640	94, 990. 00	-----
1935.....	61, 900	66, 853. 80	\$48, 697
1936.....	160, 160	124, 027. 80	102, 645
1937.....	180, 260	326, 059. 40	250, 217

† No records are available on actual savings prior to 1935.

Source: International Harvester Co.

An array of 23 of these appropriations by the length of time in which it was estimated they would "pay for themselves" bears out the conclusion that in general they "pay for themselves" within a relatively short period of time. The annual savings anticipated on 18 of these 23 appropriations were sufficient to return the investment involved within 2 years.

TABLE 23.—*Appropriations for which estimated "savings" were calculated, Farmall plant, 1935–38*

Distribution by time required to "pay for themselves":

Under 6 months.....	13
6 months to 1 year.....	6
1 year to 2 years.....	7
Over 2 years.....	7
Total.....	33

Source: International Harvester Co.

Certain circumstances have limited appropriations of this character in most cases to those which will "pay for themselves" within a relatively short period of time. These appropriations are generally made for the purchase of tooling equipment and similar machines on which obsolescence is frequently very high. In fact, capital write-offs, which amounted to \$200,000 in 1937, apply primarily to this type of equipment. This rapid obsolescence, and other conditions affecting this type of investment, have apparently resulted in a rough rule of thumb in accordance with which appropriations accompanied by estimated savings are seldom made between major plant or model

changes unless they appear likely to "pay for themselves" within about 2 years. This rule-of-thumb requirement results in technical improvements which have not been approved, being postponed for consideration until major plant or model changes are made.

THE TIMING OF TECHNOLOGICAL CHANGE

Technical change in the International Harvester Co. apparently takes place most rapidly in the midrecovery period. During depression years the regular engineering staff is not ordinarily depleted by lay-offs. The technicians have considerably more time to devote to research and experiment. Yet, in periods of depression appropriations are seriously curtailed, except for the most necessary expenditures. Even technological changes that have been approved in principle are not apt to be put into production until output expands considerably. Management during depression is unable to forecast the length of the depression period or the changes in the demand for individual products that will accompany recovery.

It is obvious from the method of calculating anticipated "savings" on "cost reducing" appropriations that the dollar volume of "savings" to be achieved by these appropriations will increase proportionately as output expands. Only when output is at a relatively high level can "savings" be expected, in most cases, to be large enough to return the outlay within a short period, and thus transform the backlog of technical discovery of depression years into appropriations for additional equipment.

In the short run the prospect of an increased volume of output is, therefore, likely to be much more effective in bringing application of the new technological processes of this type than increased wage rates. There would appear to be very little direct relation between the timing of such technological changes and increased wage rates, although both tend to increase with larger volumes of output. Over a longer period, wage-rate changes may exert a more substantial influence on the rate of technological change.

EFFECT OF TECHNOLOGICAL CHANGES ON LABOR AND MATERIAL COSTS

Another important question centers on the effect of technological changes, in general, on labor costs and material costs. In the example given above it appeared that "savings" were made in both labor and material costs, although the "savings" in material costs were greater than those in labor costs. An examination of 31 "cost reducing appropriations" made for the Farmall plant during 1935-38 indicates that about one-half of the "savings" were in labor costs. However, this proportion varies widely from one appropriation to another; in some instances decreases in material costs were accompanied by increases in labor costs.

Technological changes covered by this limited group of "decisions" frequently result in increases in labor or material costs, designed to make improvements in the tractor. Over 200 decisions involving the F-20 tractor and a large number of GPC letters were studied in detail, with a view to appraising the composite effects of these changes on costs. While it is impossible to discuss these changes in detail, some idea of their effects on costs can be gained from an analysis of the

changes in normal costs on the F-20 tractors from November 1, 1935, to April 25, 1939. In this period, changes in design of the tractor increased the material costs per tractor \$2.90 and increased labor costs \$0.55, in each case less than 1 percent of total material and total labor costs. Changes in the methods of production, partly as a result of "cost reducing appropriations," reduced normal labor costs during this period by \$3.03. This reduction arose from the elimination of certain operations and other changes in the methods of production, such as making a part by welding rather than by casting.

If the effects of changes in models on costs (as distinct from changes within the same model) are studied, the above tendencies are even more marked, as the changes are of larger magnitude. For instance, productive labor costs (adjusted for foundry labor) on the tractor, a new model of which was introduced in 1934, decreased by 15.2 percent from 1929 to 1937, despite an increase of 21.5 percent during this period in the wage rates paid at the Farmall plant. Material costs increased in this period by 1.3 percent. Partly these changes were the result of changes in the design of the tractor, but they were to a considerable extent the consequence of those major changes in machinery and equipment which usually accompany model changes. Many investments are made at such a time on which "savings" cannot be estimated.

To a small degree this tendency for technological and design changes to result in lower labor costs and a lower proportion of labor to other costs may be attributed to the interpretation sometimes given by the engineering department to the company's accounting system, when not checked by the accounting department. For instance, it may be possible to strengthen a part of a machine by using more expensive steel, or by performing an additional operation, requiring a larger expenditure for labor. Because overhead costs are allocated to particular parts and implements on the basis of productive labor expenditures⁷ there appears to be some tendency for engineers to prefer to add to material instead of to labor expenditure under these special circumstances on the grounds that "labor carries burden." As a matter of fact, the overhead costs of the company as a whole are, of course, unaffected by such a decision, and the situation affords an example of the far-reaching influence of accounting conventions upon business policy decisions.

More importantly, the decline in the proportion of labor costs to total costs can be attributed to technological changes which may have been introduced because of the discovery of a better method of production or of an improved design for the product, or to a change in the relative prices of labor and new materials which resulted in the substitution of equipment or materials for labor.

⁷ See Appendix to ch. II, p. 99.

APPENDIX A

OBJECTIVES OF THE SURVEY

The specific objectives of this study as they were initially outlined, are given in the following preparatory memorandum submitted to the executives of the International Harvester Co.:

(1) It is proposed to study the process of price determination followed by the International Harvester Co. The following questions illustrate the range of interest and the type of information that would be desired. Such information would be primarily qualitative, rather than statistical, and collected by interview. What sort of cost information is available and utilized by those charged with the responsibility of setting prices? How is this information taken into consideration? What other factors are considered and how important are they? Such as—the price policy pursued by rivals, estimated demand, prices of raw material, etc. What is the precise mechanism of price setting: The quoted price and the terms of sale. Who among the officials of the corporation is charged with setting prices and how is the exercise of this responsibility coordinated with the duties of other officials?

(2) What factors are taken into consideration by the management in introducing new equipment and machinery? In a plant that is selected for detailed study on other issues, consider recent introductions of labor-saving equipment. Why were they made and what factors influenced their particular timing? Considering the period 1935–38, an analysis of the capital expenditures for such plant would throw light on these questions. Some changes were undoubtedly introduced in the expectation of reducing labor costs, others were normal replacements, still others were made in the hope of reducing raw material and capital charges. If possible, it would be highly useful to analyze the cost structure both before and after some of these technical changes.

(3) In order to answer questions on the relationship between wage and price changes for particular products, a statistical study is proposed, based upon the cost accounting in the International Harvester Co. Partially because of the relationship to the problem listed under (4) it was thought that the products selected for analysis would be the F-20 and F-30 tractors and perhaps the Light Line Motor Trucks. Ideally, the information desired from these cost records would show for as long a period of time as the records permitted the break-down of total costs into a rather detailed classification. Such information would permit one to trace the adjustments that were made in the cost-price structure of the product following a wage change. Instead of making the usual simple statistical correlation between changes in wage rates and prices, this information would indicate the complexity of business adjustments and permit tracing these in some detail. For instance, technical changes of a labor saving character following a wage increase might be reflected in an increased depreciation cost. Such a detailed unit cost break-down could then be utilized to explore by interview the reasons for the various adjustments.

(4) To study the relationships between wage movements and output, statistical totals should be collected for a plant. It is suggested that the Farmall, Rock Island, Ill., plant be chosen. Its output is mainly confined to the products or parts of the products suggested for study under (3) above. This plant produces F-20 tractors (complete), the chassis of F-30 tractors, the motor of T-20 tractors, the motor of Light Line trucks, repair parts for these machines, and certain other minor products. The statistical information desired would include a series of output for each of the products produced in the plant during such a period as 1935–38 in convenient accounting units of time and a series of the total wage bill in the plant, broken down into certain main occupational classifications.

(5) It is also suggested that the question of the factors considered by management in the selection of locations for new plants be made a subject of interview discussion. In this connection, some attempt could be made to appraise the importance of wage differentials in these decisions. The most advisable course of procedure would seem to be the detailed examination of the recent decision to construct a new plant in Indianapolis. Using this as a case study, the administrative procedure followed and the relative importance of such factors as transportation costs, wage rates, markets, and future changes in these factors could be appraised.

APPENDIX B

STATISTICAL TABLES

TABLE I.—Sales of agricultural implements and of repair parts by International Harvester Co. and cash farm income

[Index numbers, 1929=100]

Year	Tractors and im- plement sales	Repair part sales	Cash farm income ¹	Year	Tractors and im- plement sales	Repair part sales	Cash farm income ¹
1929.....	100.0	100.0	100.0	1934.....	33.3	85.0	59.9
1930.....	80.5	101.2	79.2	1935.....	65.6	115.0	67.2
1931.....	39.3	80.7	56.0	1936.....	78.2	111.4	75.7
1932.....	14.2	57.5	41.7	1937.....	114.7	129.0	81.2
1933.....	14.7	62.4	48.2				

¹ Includes Government payments.

Source: International Harvester Co.

TABLE II.—Wholesale prices of farm machinery, 1913-38

[1926=100]

Year	Farm machinery	All com- modities	Year	Farm machinery	All com- modities
1913.....	92.3	69.8	1926.....	100.0	100.0
1914.....	92.5	68.1	1927.....	100.0	95.4
1915.....	90.8	69.5	1928.....	99.0	96.7
1916.....	90.7	85.5	1929.....	98.0	95.3
1917.....	89.6	117.5	1930.....	96.4	86.4
1918.....	118.8	131.3	1931.....	93.5	73.0
1919.....	117.8	138.6	1932.....	89.8	64.8
1920.....	112.4	154.4	1933.....	87.7	65.9
1921.....	124.8	97.6	1934.....	89.5	74.9
1922.....	96.4	96.7	1935.....	91.6	80.0
1923.....	96.6	100.6	1936.....	92.3	80.8
1924.....	100.7	98.1	1937.....	95.6	86.3
1925.....	99.1	103.5	1938.....	96.9	78.6

Source: Bureau of Labor Statistics.

TABLE III.—*Wage rates¹ and hourly earnings, 1930–37, International Harvester Co. plants in the United States*

[Index numbers, 1930=100]

Year	West Pullman		Auburn		Canton		Chattanooga		Farmall		Fort Wayne	
	Wage rates	Average hourly earnings	Wage rates	Average hourly earnings	Wage rates	Average hourly earnings	Wage rates	Average hourly earnings	Wage rates	Average hourly earnings	Wage rates	Average hourly earnings
1930.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1931.....	97.5	101.6	97.5	100.9	97.5	102.1	97.5	102.9	97.5	102.8	97.5	98.9
1932.....	82.9	89.6	82.9	86.4	82.9	89.2	82.9	89.0	82.9	89.5	82.9	86.3
1933.....	81.9	84.1	81.9	80.8	81.9	86.7	81.9	86.5	81.9	81.8	84.2	79.2
1934.....	97.3	99.0	96.3	94.2	96.3	102.3	96.3	99.8	96.3	96.1	109.5	107.5
1935.....	106.1	109.6	97.0	98.6	97.0	112.5	97.0	105.5	105.0	108.9	113.3	117.3
1936.....	108.6	111.0	104.4	105.2	104.5	124.3	104.4	113.5	108.6	116.2	114.0	117.2
1937.....	121.5	126.4	115.7	119.2	117.8	149.4	116.8	132.0	121.5	137.9	127.0	140.8

Year	McCormick		Milwaukee		Rock Falls		Richmond		Springfield		Tractor	
	Wage rates	Average hourly earnings	Wage rates	Average hourly earnings	Wage rates	Average hourly earnings	Wage rates	Average hourly earnings	Wage rates	Average hourly earnings	Wage rates	Average hourly earnings
1930.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1931.....	97.5	98.7	97.5	96.8	97.5	104.9	97.5	99.6	97.5	103.1	97.5	97.1
1932.....	82.9	87.8	82.9	80.2	82.9	91.6	82.9	83.5	82.9	88.3	82.9	83.2
1933.....	81.9	83.5	81.9	74.4	81.9	88.1	81.9	80.7	84.2	87.9	81.9	76.4
1934.....	97.3	94.2	97.3	85.0	96.3	96.9	96.3	95.7	109.5	107.0	97.3	94.4
1935.....	106.1	104.5	105.7	97.2	97.0	99.8	97.0	102.0	113.3	120.4	106.1	108.9
1936.....	108.7	109.0	110.2	101.2	104.6	104.3	104.3	108.6	113.9	130.7	108.6	113.6
1937.....	122.0	127.1	125.3	120.0	120.2	126.3	115.2	127.4	127.4	147.9	120.0	128.4

¹ Weighted average for each year of percentages of 1930 wage rates.

Source: International Harvester Co.

TABLE IV.—*Ratio of depreciation charges to total overhead costs and to total production costs, selected plants of the International Harvester Co., 1929, 1933, and 1937*

[Percent]

RATIO OF DEPRECIATION TO TOTAL BURDEN

Plants	1929			1933			1937		
	Works	Foundries	Total	Works	Foundries	Total	Works	Foundries	Total
Auburn.....	6.84	12.39	7.90	17.98	19.24	18.36	7.63	6.03	7.16
Canton.....	8.06	9.73	8.16	37.65	26.74	37.09	10.72	3.88	10.14
McCormick.....	7.61	8.63	7.83	15.18	17.47	15.76	8.53	8.24	8.39
Farmall.....	7.19	6.41	7.10	53.93	34.32	50.87	13.32	7.06	12.20
Rock Falls.....	9.06	-----	9.06	16.26	-----	16.26	5.65	-----	5.65
Milwaukee.....	10.04	9.04	9.88	32.22	25.78	31.27	12.27	8.40	11.66
Richmond.....	11.29	7.35	10.74	27.77	18.61	26.28	9.28	7.09	8.90

RATIO OF DEPRECIATION TO TOTAL COST OF PRODUCTION

Plants	Works	Foundries	Total
Auburn.....	-----	-----	1.81
Canton.....	-----	-----	2.10
McCormick.....	-----	-----	2.25
Farmall.....	-----	-----	1.42
Rock Falls.....	-----	-----	1.06
Milwaukee.....	-----	-----	1.92
Richmond.....	-----	-----	2.52

Plants	Works	Foundries	Total
Auburn.....	-----	-----	5.13
Canton.....	-----	-----	9.38
McCormick.....	-----	-----	4.99
Farmall.....	-----	-----	28.94
Rock Falls.....	-----	-----	2.57
Milwaukee.....	-----	-----	16.14
Richmond.....	-----	-----	7.41

Source: International Harvester Co.

APPENDIX C

TYPES OF COST-REDUCING APPROPRIATIONS

Between January 1935 and the end of 1938, 31 reports on cost-reducing appropriations were made in the Farmall plant. In the main these expenditures involved technical changes which could be classified as either (1) primarily affecting overhead of the plant, (2) changing the method of producing particular parts, or (3) changing the design of particular products. Such changes usually reduced the cost of both labor and material per unit of product, although in some instances one was increased while the other was decreased.

Illustrative of the first type of technological change is an expenditure of \$12,964.14 which was made by appropriation No. 14327 to construct storage tanks for naphtha, lubricating oil, cutting oil, and S. S. Spirits. Under the old plan, these liquids were purchased in small shipments, but by the construction of these storage tanks, lower prices were paid on carlot shipments. The estimated savings (in the first year) were \$7,593.58. This saving was a saving in material costs.

Instances that may be classified under (2) are illustrated by the following: (a) An expenditure of \$9,657.94 was made to purchase tooling, pattern, and machine equipment necessary for a redesigned fan bracket for the F-20 tractor. Under the old plan, the fan-bracket assembly had a spring adjustment, flat belt, and cast-iron pulleys, while under the new, the adjustment is made by a positive action set screw. The belt is of a V-type and pulleys are made of 2 pieces of pressed steel riveted together with a cast-iron hub. For 100 pieces old and new costs were as follows:

	Materials	Labor	Total
Old.....	\$150. 60	\$50. 81	\$201. 43
New.....	121. 98	35. 88	157. 86

Estimated annual savings less 6-percent depreciation on the investment: \$16,076.40.

(b) An expenditure of \$17,946 for the purchase of hi-cycle portable electric tools and equipment for the chassis and subassembly lines for the F-20 tractor resulted in a saving of \$22.60 per 100 F-20 tractors. Whereas 28 air tools had formerly been used, the new plan used 58. Total appropriation less 6-percent depreciation "saved" \$10,187.89. This saving was exclusively in labor costs.

APPENDIX D

LOCATION OF A NEW PLANT

The recent tendency toward the diffusion of industry—its move toward the South and the far West and from the centers of large cities to the outlying metropolitan areas and to small towns—has many important implications for labor as well as for industry and government. The diffusion of population, with an attendant tendency for existing property values to decline in the older industrial areas, the effect upon labor costs as production moves to lower wage areas, and the shifting burden upon transportation facilities are illustrative of the social and economic byproducts of changes in plant location. The factors which lead businessmen to make decisions on new plant location are accordingly of great interest. The International Harvester Co. has expanded its plant facilities in recent years largely by additions to existing works rather than by the construction of entirely new plants. A new plant to make truck engines was recently completed, however, at Indianapolis, Ind. The following analysis is largely based upon memoranda in the company's files and others prepared especially by President McAllister for this inquiry.

Prior to the construction of this new plant the engines for the smaller models of trucks, manufactured at Springfield, Ohio, were made at the Farmall works in Rock Island, Ill. With the expansion in tractor and truck sales in 1935-37, it became difficult to make the required number of truck engines at the Farmall plant. In addition, engines were made at the tractor works in Chicago for one size (the F-30) of the tractors manufactured in the Farmall plant. The construction of a new truck-engine plant not only would expand capacity but also would permit the transfer to the new plant of the truck motors made at Farmall and the transfer to the Farmall plant of the F-30 tractor motors from the tractor works in Chicago. It would also make possible the transfer of the manufacture of engines for the larger truck from Fort Wayne to the new plant, thus concentrating all truck-engine manufacture in one plant, and freeing the facilities at Fort Wayne for expanding the manufacture of axles, transmission, and other parts.

The company analyzed four possible locations: Springfield, Fort Wayne, Rock Island, and Indianapolis. Since the existing Springfield assembly plant was to use most of the engines produced by the contemplated unit, it would have been desirable to locate the new factory there, but there was no satisfactory site available and, according to President McAllister: "The location of an engine plant at Springfield would have doubled the number of International Harvester Co. employees, bringing the total, in times of full production, to 10,000 employees in a town of 65,000 inhabitants. This was regarded as too high a ratio, creating too much of a one-industry town where fluctuations in business are felt more severely than in a larger town

with a larger number of industries whose ups and downs to some extent offset each other." ¹

Springfield having been eliminated, the remaining locations, Rock Island, Fort Wayne, and Indianapolis, were compared in detail. Attention was focused on the following factors: The character of the site, freight charges, and the nature of the labor force.

In selecting a site, the amount of land required for the plant, with allowance for possible expansion, was compared with existing land-holdings and the availability of adjoining parcels in cities where the company held properties. In other cities the availability of sites was canvassed, and the costs of additional purchases, taxes, public utility services, railroad and transportation facilities were compared. The company has provided land for employee gardens in connection with a number of its plants and the availability of land which could be used for this purpose was investigated.

In considering transportation costs, freight charges for transporting the motors produced at the proposed plant to Springfield and Fort Wayne from each location under consideration with the new plant operating at various levels of production, were compared.

The labor market in each location was also studied in detail and the number and the quality of the prospective labor forces canvassed with reference to their skill and training. In this connection, the United States Employment Service offices in the various cities provided considerable information. The company knew the occupational groupings that would be required in the new plant, and the employment offices provided approximate estimates of the number of unemployed persons available in these occupations. As plants of the International Harvester Co. were already located at two of the three cities seriously considered (Fort Wayne and Rock Island), the works superintendent and other officials at each plant were consulted as to the quantity and quality of available workers. The fact that companies in the automobile industry had previously been located in Indianapolis, where the company did not have a plant, was considered to be an important indication of the availability of a labor force of the general type required.

The relative cost of living in the cities under consideration was also examined. Studies of cost of living in Fort Wayne and Springfield made by the works councils of the International Harvester Co. were utilized, and reports of the Bureau of Labor Statistics indicating trends in the costs of living in comparison with other cities were analyzed where they were available. Housing facilities for added wage earners needed by the plant were also given particular attention.

Comparative studies were made of prevailing wage rates. Plant superintendents furnished information regarding wage rates in various industries in Fort Wayne and Rock Island, while special agents were sent to Indianapolis to secure data on prevailing wage rates. In a memorandum on the Indianapolis decision the company investigators reported that common-labor rates in that city were about 20 per cent below those in any other city considered.

The officials of the International Harvester Co. have stated that they did not expect the wage differential between Indianapolis and the other cities considered to be maintained over a long period of years

¹ Memorandum of September 1939, by President McAllister.

and hence it did not carry great weight in their decision to locate there. A number of firms going out of business in Indianapolis during the depression, and the large labor supply had forced wages down to an unusually low level. The return of industry, illustrated by the construction of this plant of the International Harvester Co., could be expected to increase wage rates to a level more nearly comparable with that in other cities.

The character and the degree of unionization in each city was also studied, and the specific occupations and industries in which unions were present were listed.

As in the case of Springfield, the proportion of the total population which would be in the employment of the International Harvester Co. if the proposed plant were constructed, particularly at peak levels of operations, received considerable attention. It was considered undesirable to have a very high proportion of the workers in any one city in the employment of the International Harvester Co. as fluctuations in its production schedules would influence the whole community, and, if labor shortages developed, wage rates might be expected to move up rapidly during periods of peak operations. On the other hand, if industry in the city were diversified, the peak periods for the various concerns might tend to dovetail, permitting transfer of employees from one to another as each hit its production peak. Competitive demands for labor on the part of other important firms in each prospective city received consideration and special attention was focused on the potential demand for skilled labor.

On the basis of these considerations it was determined to locate the plant at Indianapolis. Mr. McAllister, the president of the International Harvester Co., has indicated that:

The controlling reasons which led the management to decide on Indianapolis as the location for the new engine plant may be summarized as follows:

1. A desirable site was obtainable outside of the city limits and not subject to city taxes but easily accessible by streetcar and with water, sewer, light, and power facilities available.

2. An adequate supply of common labor and of labor already skilled or capable of training. Indianapolis had been unfortunate in the closing down of a number of industries, leaving a large unemployment problem. The city officials, chamber of commerce, and citizens generally were all anxious to relieve this situation by bringing about the location of new industries and were very cooperative and helpful in locating and obtaining a desirable plant site with railroad and all other necessary facilities.

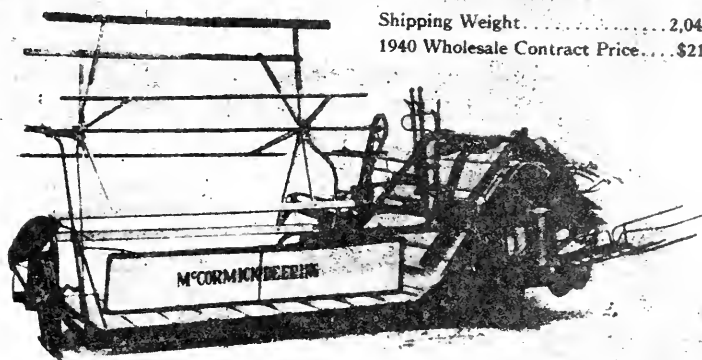
3. Satisfactory housing situation.

4. Low cost of living.

APPENDIX E

ILLUSTRATIONS OF TYPICAL FARM MACHINES

GRAIN BINDER

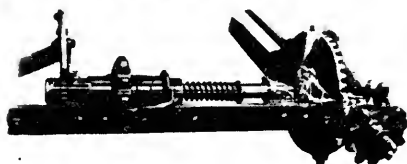


Shipping Weight.....2,040 lb.
1940 Wholesale Contract Price....\$217.50

Rear view of 8-foot grain binder, enclosed-gear type.



The elevator drive gears are enclosed to avoid excessive wear.



Binder main drive assembly. The large bevel and pinion gears are completely enclosed and run in oil. There are three large roller bearings and an adjustable ball-thrust bearing.



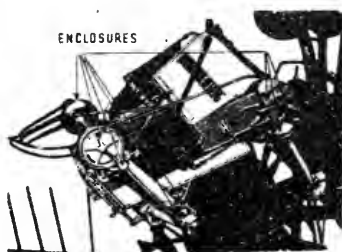
The packer crankshaft is a one-piece steel drop-forging. The five bearing surfaces are accurately ground and polished.

Main drive gears fully enclosed and run in oil.
Gears, cams, and vital working parts of binding mechanism are enclosed and protected from dirt and trash.

Bearings are fitted for pressure-gun lubrication.
Main frame of heavy bar steel, K-braced for rigidity.
Platform sills rigidly attached to main frame at four points to resist twisting strains.

Full-floating elevator. Automatically adapts itself to heavy or light volumes of grain.

Improved binding attachment. Six enclosures protect vital points. Knotter parts heat-treated. Packer crankshaft of drop-forged steel with accurately ground bearing surfaces. Packer arms have replaceable, 2-piece, malleable bearings with take-up slims. Driving clutch is 6-point, fully enclosed.



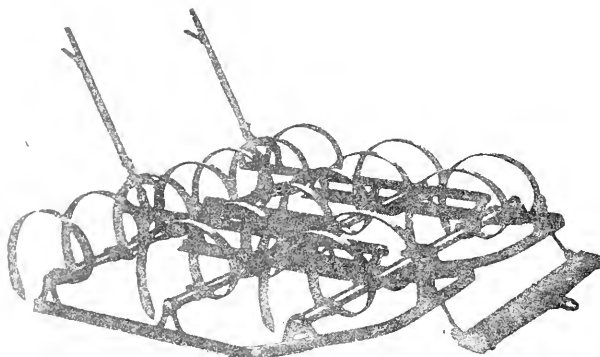
Enclosures are provided at various points of the binding attachments as indicated, to protect the gears, cams, and vital working parts from dirt and wear.

SPRING-TOOTH HARROW — 17-TOOTH, 2-SECTION

Shipping Weight

240 lb.

1940 Wholesale Contract Price. . . \$20.25



This harrow is of all-steel construction. Each tooth is heavy-gauge, heat-treated spring steel with a large coil which makes it possible to work to a depth of 5 to 6 inches. Width of teeth, $1\frac{3}{4}$ inches; thickness, $\frac{1}{4}$ -inch.

The teeth are mounted on round pipe bars with a strong spanner hitch which puts all strain on the pipe and none on the bolt.

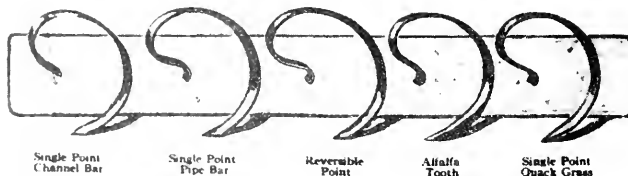
The runners on the frame which slides on the ground and gauges the depth of the teeth are shod with removable shoes which can be replaced at small cost when worn.

There is an individual lever for adjusting the depth

of tooth penetration of each of the two sections. These levers are so built that they can be set at the rear of the harrow when using horses, or at the front when using a tractor.

Channel bars instead of pipe bars are available on special order at no increase in price. Teeth are mounted on channel bars with U-bolts and clamps.

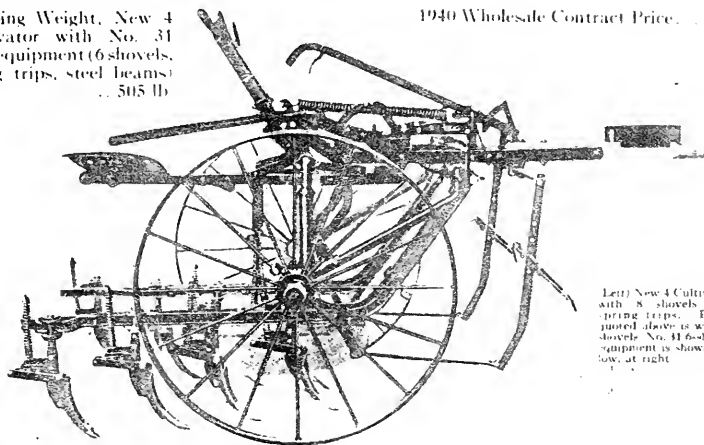
A wide variety of teeth and teeth points are available, as shown below. The tooth at the left is for a channel-bar harrow, as indicated, and the others are for pipe-bar harrows. All styles of teeth can be supplied for either pipe or channel bar harrows.

Single Point
Channel BarSingle Point
Pipe BarReversible
PointAlfalfa
ToothSingle Point
Quack Grass

CULTIVATOR—2-HORSE RIDING

Shipping Weight, New 4
Cultivator with No. 31
gang equipment (6 shovels,
spring trips, steel beams)
... 505 lb

1940 Wholesale Contract Price... \$52.25



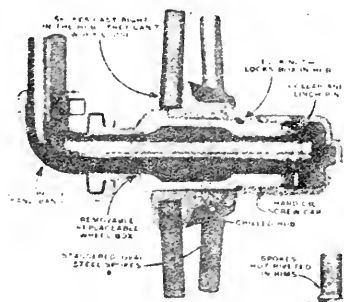
Left: New 4 Cultivator with 8 shovels and spring trips. Price quoted above is with 6 shovels. No. 41 6-shovel equipment is shown below, at right.

This is a pivot-axle, balance-frame cultivator with a perpendicular frame arch resting on two large bearing balls—one at each end of the arch. The axles extend forward, parallel to the wheels, and attach to pivot points on a bar at the front of the cultivator. The gangs also attach to this bar. The wheels therefore pivot and the gangs shift at the same time, giving double-quick action in dodging plants out of line. Also, the pull *from ahead of the wheels*, made possible by this construction, makes it unnecessary for the operator to hold the wheels in position. The action of the wheels is like that of a faster wheel—even when

the operator presses a foot treadle to dodge a plant out of line, the wheels automatically return to a straight-forward position as soon as the treadle is released.

The frame arch telescopes, making the cultivator adjustable for 28 to 42-inch rows. A master lever with a large, adjustable spring raises and lowers both gangs at once. There is also a separate lever for each gang to individually adjust gang pressure. A lever at the front of the driver adjusts the gangs to the horses' height. Between the gangs is a small lever for spreading or narrowing the gangs.

The eveners are steel and adjustable to four different heights. The seat and foot treadles are adjustable to tall or short drivers. The seat can be folded over out of the way when putting on new shovels.



Cross-section of wheel hub showing replaceable wheel box, hand, collar and lynch pin for adjustment, and method of casting spokes in hub.

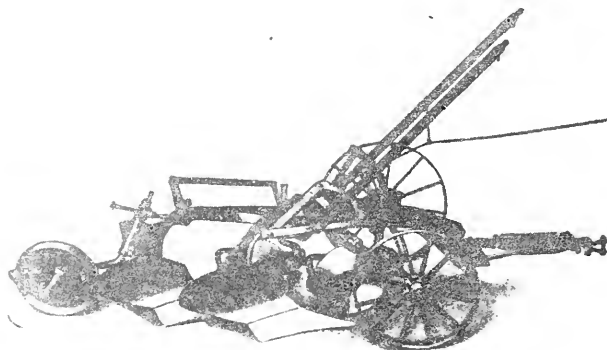


Rear view, No. 41 6-shovel equipment, showing springs which hold shovels under pressure but which permit shovels to trip back without damage when encountering heavy stones and similar obstructions.

TRACTOR PLOW—No. 8 LITTLE GENIUS—2 FURROW

Shipping Weight.899 lb.

1940 Wholesale Contract Price.\$96.00



Two 14-inch bottoms—28-inch cut.
Built to sustain plowing strains in various tillable soils.

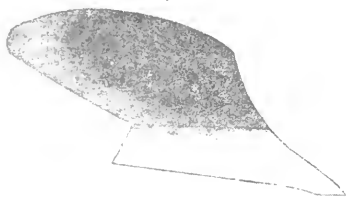
Beams of special plow beam section, heat-treated.

Axles of high-carbon steel, heat-treated.

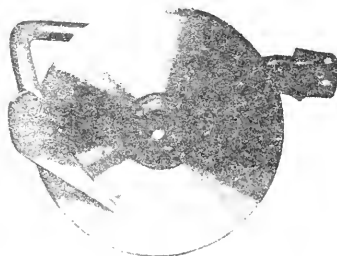
Bottoms accurately drilled and interchangeable with other bottoms designed for different soil types permitting duplication of beam and bottom dimensions.

Power lift. A pull on a trip rope causes bottoms to be lowered mechanically, another pull on same rope causes them to be returned to raised position. Power lift clutch enclosed against dust and grit.

Spring-release hitch. If plow encounters a stone or other obstruction which might otherwise damage the plow, it is automatically released, preventing damage.



Moldboards and shares of soft-center steel made by rolling mills, especially for use in plow bottoms, by welding together three bars—two of high carbon steel and a middle bar of low carbon steel that will not harden and rolling them into plates. After parts are cut and shaped they are subjected to scientifically controlled heating and tempering processes which make the outer layers extremely hard, giving maximum soil shedding and wear-resistant qualities. Inner layer stays tough—resists breakage.

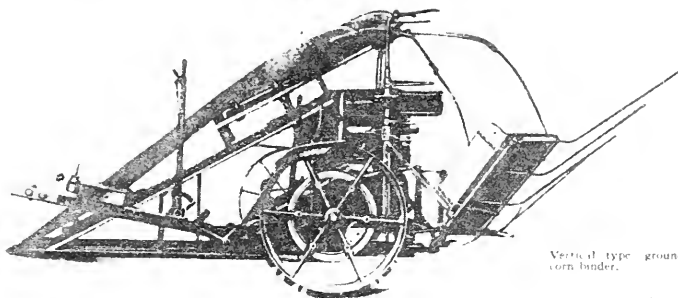


Combination rolling coulter and jointer. Coulter cuts sod and lightens plowing load. Jointer cuts a small furrow off the edge of the furrow and throws it to center—object: good trash coverage, more thorough mixing of humus with soil, more rapid incorporation with soil.

Wheels equipped with replaceable boxings for easy replacement.

CORN BINDER

Shipping Weight.....1,620 lb.
 1940 Wholesale Contract Price.....\$191.00



Vertical-type ground-drive
corn binder.

Internal gear and pinion drive. Principal drive shafts equipped with roller bearings.

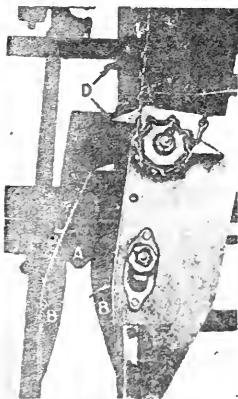
Heavy main wheel, 36 x 8 inches, lugged for effective traction. Operates on roller bearing. Adjustable for height.

Three sets (6) gatherer chains, heavy, malleable, link-type with fingers.

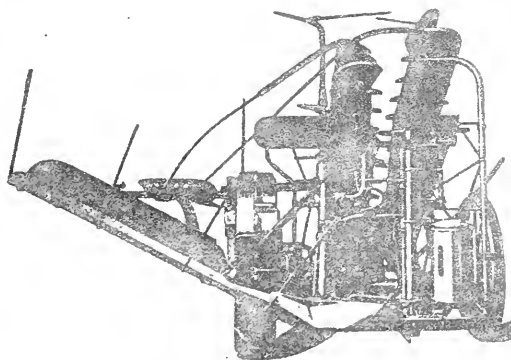
Cutting mechanism comprised of reciprocating knife and two stationary side knives. All-steel knives removable for sharpening.

Vertical type binding attachment. Adjustments provided for tall or short corn.

Knotter parts drop-forged and heat-treated.
 Drop-type bundle carrier and 3-horse hitch.



View of cutting knives and part of gathering mechanism. "A," reciprocating knife action. "B," stationary side knives. "C," tempered steel thrust spring. "D," malleable gatherer chain fingers.

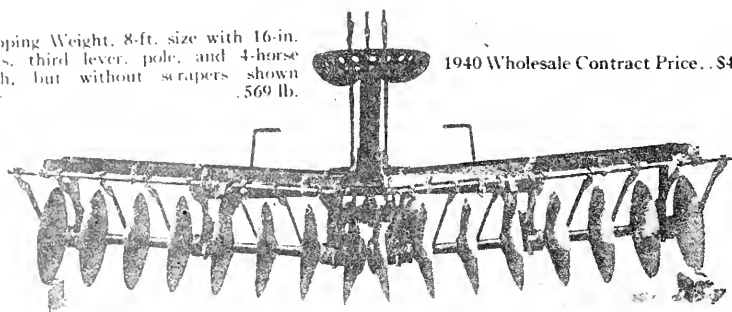


Rear view of the corn binder showing the vertical type binding mechanism and drop-type bundle carrier.

DISK HARROW—HORSE DRAWN

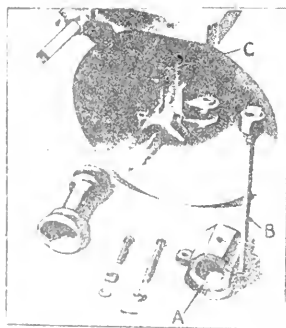
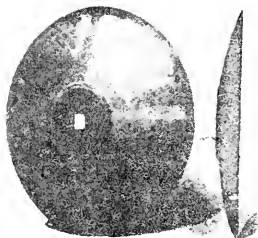
Shipping Weight, 8-ft. size with 16-in. disks, third lever, pole, and 4-horse hitch, but without scrapers shown here .569 lb.

1940 Wholesale Contract Price...\$47.25



Above: Rear view, showing center and side gears and shaft. Third lever, included to permit disks to make a possible 180° turn, is shown easily and quickly.

(Right) Each of the sixteen disks is heat-treated and has a crimped center, as shown here. The crimped center adds to the strength of the disks. It acts as a shock absorber for the center of the disk where, as in a wheel, there is the greatest strain. Being flat, the crimp makes it possible to use spacing spools (between the disks) that have flat ends that are accurately ground to make a close fit between spacing spools and disks preventing looseness and consequent breakage.



(Left) There are six of these bearings and standards on each 8-ft. harrow. "A" points to oil-soaked hard wood bushing which is reversible. "B" is oiler which puts lubricant at rear and bottom of bearing, where there is least amount of pressure and therefore largest amount of space. Lubricant circulates from this large reservoir entirely around bearing. Steel standard "C" is set edgewise to give maximum clearance between disks for trash.



(Above) Main frame is of angle steel, securely braced with gusset plates. Steel stub tongue comprises two angle-steel bars solidly fastened to hounds and rear rail, the whole forming a frame that is very strong. Also shown here are pole and two-horse hitch. Price quoted above includes four-horse hitch.

SIDE DELIVERY RAKE AND TEDDER

Shipping Weight.....903 lb.

1940 Wholesale Contract Price...\$94.50



Side delivery rake and tedder. Raking width, 7 ft. 3 in.

By means of a lever, this machine is convertible from a side delivery rake to a tedder, and vice versa.

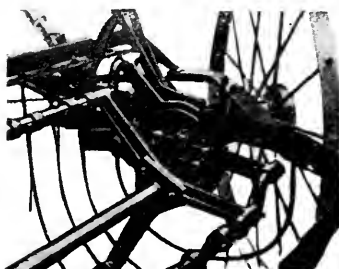
Teeth mounted on pipe bars, each bar having an eccentric movement for efficient raking.

Oil-tempered coil-spring teeth.

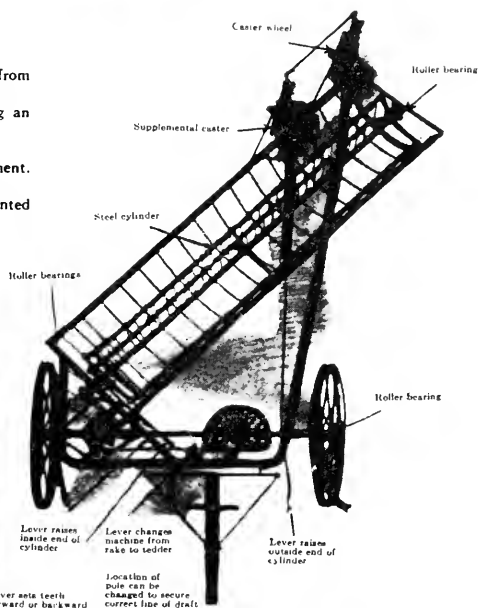
Drive gears held in heavy cast frame for alignment.

Quick-shift device for adjusting pole laterally.

High-arched angle-steel frame with spring-mounted rear caster wheel.



End view of reel showing the tooth control mechanism.

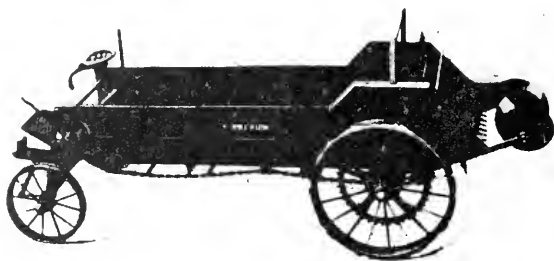


Overhead view with various features indicated.

MANURE SPREADER—No. 4-A ALL-STEEL

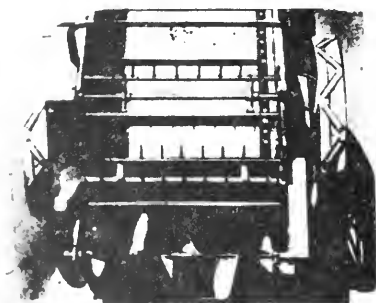
Shipping Weight 1,595 lb.

1940 Wholesale Contract Price . . . \$139.00

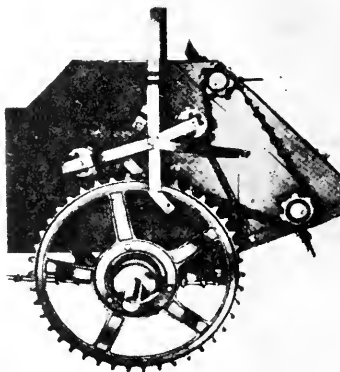


The No. 4-A all-steel manure spreader has a capacity for 60 to 70 bushels of manure. The box is made of rust-resisting heavy-gauge steel. The rear axle is mounted on malleable brackets which together with special axle bearing cages provide perfect alignment of rear wheels even when the spreader is heavily loaded. The rear wheels are of 42-inch diameter with $5\frac{3}{4}$ -inch tires to provide leverage for driving beaters. Altogether there are twelve roller bearings with hy-

draulic-pressure lubrication for light draft, and a large grease gun is provided as regular equipment. The beaters are equipped with high-carbon chiseled-pointed teeth. The widespread spiral finishes the job of shredding and spreads manure on the ground thick or thin as desired. The main chain raising device and feed mechanism are protected by steel shields. A drop-forged and reamed apron driving pawl provides accurate feed.



Rear view of all-steel manure spreader showing upper and lower spike-tooth beaters and large widespread spiral.

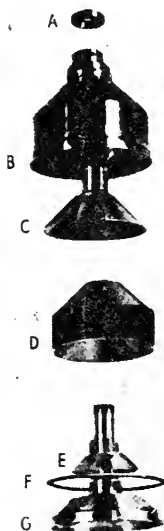


Improved driving mechanism, showing tendon spring which keeps the chain away from the sprocket when spreader is out of gear.

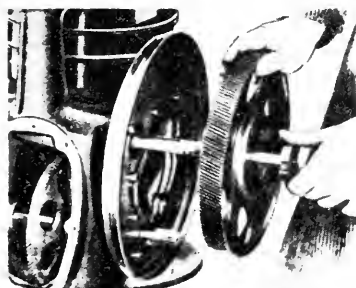
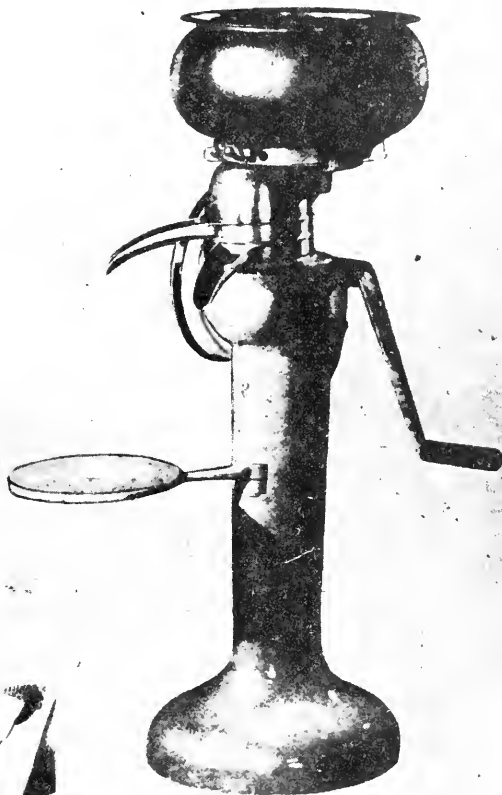
CREAM SEPARATOR — No. 3-S

Shipping Weight. 155 lb.

1940 Wholesale Contract Price. \$76.00



Stainless steel bowl showing: A, bowl nut; B, bowl shell; C, upper dividing disc; D, center disc; E, lower disc or milk distributor; F, rubber ring; G, tubular shaft.



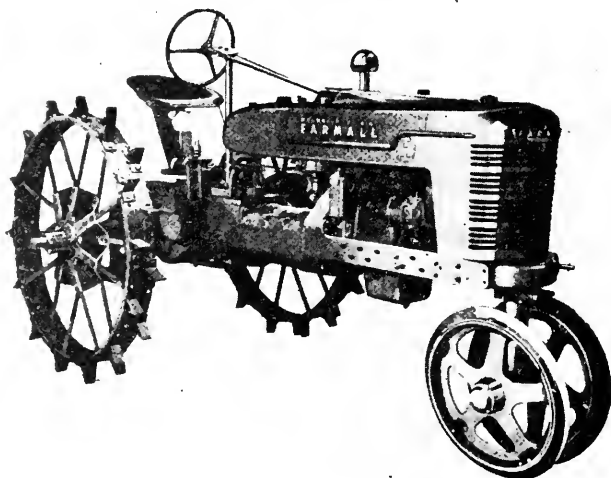
Assembly of the sturdy spiral gear and crankshaft and showing the pinion gear in separator frame. At each end of the pinion shaft are high-quality ball bearings.

The No. 3-S cream separator is equipped with an all-stainless-steel bowl and has a skimming capacity of 750 pounds of milk per hour. The bowl is accurately balanced in two transverse planes and designed for skimming as close as 0.01 percent. It can be used for separating cream of ordinary or heavy density or for standardizing whole milk. The heavily-tinned supply can and also cream and skim milk spouts, are of one-piece design to permit easy cleaning.

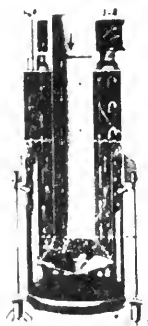
FARMALL TRACTOR—FARMALL-H WITH STEEL WHEELS

Shipping Weight 2,697 lb.

1940 Wholesale Contract Price \$556.00



A 4-cylinder, all-purpose tractor for plowing, harrowing, planting, cultivating, cutting hay, and for other field work. It has belt pulley available for belt work.



Oil-type air cleaner to prevent dust and abrasives from reaching working parts of engine



Purolator to filter crankcase oil

Vertical, valve-in-head engine with 3-bearing crankshaft — the bearing surfaces scientifically hardened (Tocco process). Precision manufacture. Replaceable cylinder sleeves.

Four speeds forward, one reverse. Ball-bearing transmission — there are 33 ball and roller bearings in this tractor. Eighteen spring-loaded rawhide dust and oil seals to keep oil in and exclude dust from all working parts of engine and transmission.

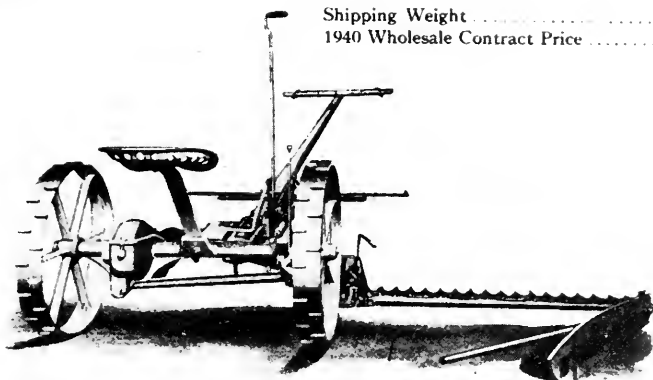
Gears made of alloy steel, carburized and hardened to file hardness.

Cooling system with water pump circulation. Adjustable radiator shutter and heat control for operation of various temperatures.

Regular equipment includes high-tension magneto with new Alnico magnets, air, oil and fuel filters. Worm steering gear.



Replaceable cylinder sleeves.

MOWER

Shipping Weight 780 lb.
 1940 Wholesale Contract Price \$72.75

Two-horse mower equipped with 5-foot cutter bar.

All drive gears, the clutch, and ratchets completely enclosed and run in a bath of oil.

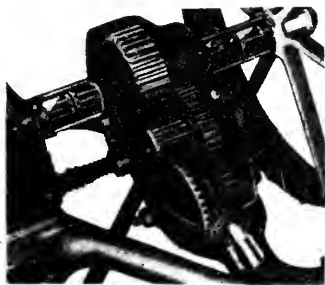
Two-piece, heavy steel axle revolves on four roller bearings.

Automatic-type pitman connection to knife head.

Steel cutter bar, heat-treated and shaped to resist sagging.

Malleable guards. Heat-treated knife sections and ledger plates.

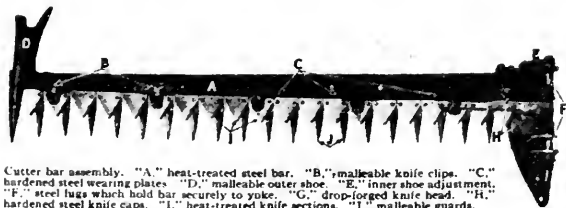
Steel lifting lever with automatic latch pawl.



Gear case with cover removed to show transmission assembly. The gears, ratchets, clutch and all axle bearings are automatically lubricated from the oil supply in the gear case.



View of 2-piece main axle with pawl plate "A" withdrawn to show construction. Figures 1 to 4 indicate roller bearings and replaceable steel wearing sleeves.



Cutter bar assembly. "A," heat-treated steel bar. "B," malleable knife clips. "C," hardened steel wearing plates. "D," malleable outer shoe. "E," inner shoe adjustment. "F," steel lugs which hold bar securely to yoke. "G," drop-forged knife head. "H," hardened steel knife caps. "I," heat-treated knife sections. "J," malleable guards.



Three spring-loaded leather oil seals used to prevent oil leakage and entrance of dust at axle bearings.

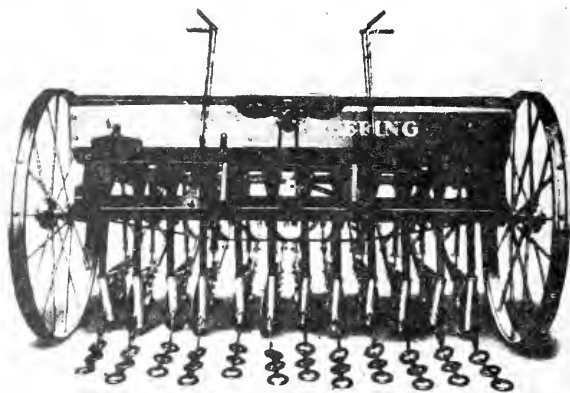
GRAIN DRILL — PLAIN, 12-7

Shipping Weight

1,117 lb.

1940 Wholesale Contract Price

. \$120.25



This grain drill is equipped with fluted-feed, closed-delivery, single-disk furrow openers and hand-lift levers. The weight of the drill is carried on roller bearings with self-aligning axle boxes, and has hydraulic pressure lubrication throughout. The rust-resisting, copper-alloy all-steel hopper has grain and water-tight lids with continuous hinge. Each fluted feed cup has an

adjustable bottom which may be set in one of three positions for planting various sizes of kernels.

The flexible angle-steel frame has reinforced corners and center rail. Well braced, high-carbon steel drag bars and pivot brackets with large wearing surfaces hold disks permanently in correct alignment. The disk blades are heat-treated and the bearings are sealed against dust and moisture.



Self-aligning steel roller bearings with hydraulic pressure lubricating fittings contribute to light draft

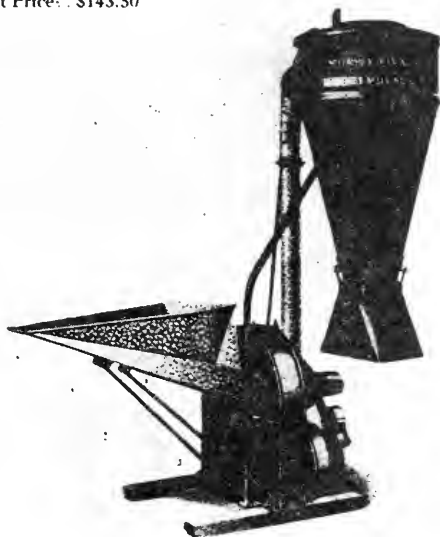


Fluted feed cup with adjustable bottom: (A) In top notch set for small grains. Feed adjustments are made at the factory with thin steel washers for accuracy.

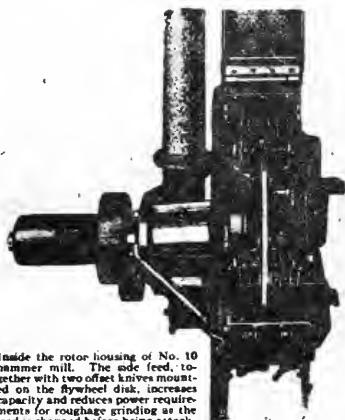
HAMMER MILL—No. 10

Shipping Weight 625 lb.

1940 Wholesale Contract Price: \$143.50



The No. 10 hammer mill is built for heavy-duty service, having a capacity up to 11,500 pounds of oats per hour with half-inch screen, and 6,700 pounds of ear corn with three-quarter-inch screen. The rotor housing is of boiler plate safety construction. On the inside are heat-treated grinding plate liners which are reversible. The two cutter knives are also heat-treated and reversible and are removable for sharpening. The main shaft runs on tapered roller bearings and the auger shaft to blower fan is mounted on roller bearings. These bearings are protected with spring-loaded rawhide seals. The 26 swinging hammers have four usable grinding edges and are heat-treated. The cyclone is made of rust-resisting galvanized steel, and two-way bagger and Rockwood drive pulley are regular equipment. Fittings are provided for pressure lubrication.



Inside the rotor housing of No. 10 hammer mill. The side feed, together with two offset knives mounted on the flywheel disk, increases capacity and reduces power requirements for roughage grinding as the feed is chopped before being attacked by the swinging hammers.

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