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W H E A T S T U D I E S

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VARIATIONS IN WHEAT PRICES

THE effort for stabilization of the general price level implies the occurrence of significant degrees of variation in the general price level. Agitation for stabilization of the price of a particular commodity, like wheat, similarly implies significant variations in price. The meaning and causes of wheat price variations have long been entangled in controversies over the prevailing system of marketing wheat. But to a surprising extent the variations themselves have not been classified, described, and explained. Analysis of wheat price variations is essential as a background to the consideration of stabilization of the price of wheat. The purpose of this study, a tentative incursion into the subject, is to offer a non-technical picture of wheat price variations, principally in the United States, during the past three decades.

We have first attempted to define the various significant types of variation. Thereafter, using several series of cash wheat prices, we have sought to illustrate the amplitude of movement in each type of variation; to indicate the immediate and distant influences to which variations may principally be traced; and to contrast variations occurring in pre-war years with those occurring in post-war years. Short-time fluctuations, month-to-month changes, recurrent seasonal movements, and shifts in wheat price level from crop year to crop year are interrelated, and difficult to separate one from the other. The price of wheat at any time is not a point, but a wide range. Consequently, on the basis of available price series, a good deal of uncertainty necessarily surrounds any attempt to describe and measure wheat price fluctuations, and to point out the principal causes of variation. The present study is not offered as conclusive; but it serves to throw into relief certain characteristics of wheat price movements which seem to require attention whenever wheat price stabilization is discussed.

STANFORD UNIVERSITY, CALIFORNIA

June 1929

W H E A T S T U D I E S

OF THE

FOOD RESEARCH INSTITUTE

The central feature of the series is a periodic analysis of the world wheat situation, with special reference to the outlook for supplies, requirements, trade, and prices. Each volume includes a comprehensive review of the preceding crop year, and three surveys of current developments at intervals of about four months. These issues contain a careful selection of relevant statistical material, presented in detail in appendix tables for reference purposes, and in summary form in text tables and charts.

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DIRECTORS

CARL LUCAS ALSBERG

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VARIATIONS IN WHEAT PRICES

I. INTRODUCTION

Price stabilization is a promulgation of increasing vogue, whether in the realm of the price level of commodities as a whole or in the case of individual commodities. There is no question that prices of most agricultural and industrial products have been and are quite variable; also, that the variations, however occasioned, create indeterminate business problems. To a lesser but still important degree, the complex of prices that make up the general level of prices is variable or unstable, giving rise to major economic problems. Both sorts of instability have received considerable attention in connection with the post-war agricultural depression, and by many price stabilization is regarded as an important element in a progressive national policy for agriculture. Effective discussion of stabilization measures must rest upon a clear understanding of the character and extent of price instability or variation, and of the forces which cause and limit these variations.

Wheat, in common with many other commodities, displays differences and variations in price. These differences and variations are of three major classes: of region, of time, and of composition. At any one time and at any point, wheats differ in type, grade, quality, and accordingly in price. In different regions or locations within a region, at a given time, wheats of the same type, grade, or quality will differ in price, largely because of the different costs involved in getting them to the most appropriate market. At different times, in a single market, even the same type, grade, or quality of wheat will command different prices. In the present discussion we are concerned primarily with the fluctuations, movements, or variations in wheat prices over periods of time; but some considera-

tion of qualitative and geographic differences is necessary if one is to deal intelligently with the complex data of actual wheat prices.

The price of any commodity, over periods of time, is subject to general and special influences. The general influences are related to monetary conditions and the price level of the various goods and services included in the economic and social life of the people. The special influences are related to the supply of and demand for the commodity, its substitutes, and those for which it may be substituted. In every analysis of behavior of prices, the segregation of the two sets of influences should be sought, however difficult of accomplishment.

In the case of wheat prices, the effects of major influences operating upon prices in general are readily discernible over periods of considerable length. The relation between business conditions in general and wheat prices in particular has not been intensively studied, but Engberg¹ is probably right in finding "very little effect of business cycles in the United States on the price of wheat." It is different with long-term trends of prices. In the two or three decades prior to 1895, wheat prices, like the general price level, showed a downward trend, while in the two decades prior to the war, both showed an upward trend; both tended sharply upward during the war; and both suffered a readjustment to a lower level in 1920-21. The trends of wheat prices have not been identical with the trends of prices in general, but both show the effects of powerful underlying causes; and one cannot interpret the trends of wheat prices without first dividing them

¹ *Industrial Prosperity and the Farmer* (New York, Macmillan, 1927), p. 258.

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into two components, one of which represents approximately the trend resulting from general causes rather than from causes more or less peculiar to wheat. In this study, however, we are not dealing with long-time movements of wheat prices; hence we need take this matter into account only in making certain comparisons between pre-war and post-war years. The period since 1921 is too short to permit one to make a satisfactory determination of the trend in either wheat prices or in the general price level; but there has been no pronounced trend in the general price level and it is probably safe to say that the trend element in wheat prices has been relatively small.

Producers and consumers of a particular commodity are concerned both with its price level and with the variability of its prices. A durable agricultural product, like wheat, has in each crop year a mean price level more or less peculiar to, or characteristic of, the crop year. In each crop year, also, one observes fluctuations around this price level. Such fluctuations may conceivably be related either to change of the wheat price level or to developments within that price level. Both producers and consumers are interested in determining whether changes in the wheat price level, or the price fluctuations around this level, are based strictly upon proved facts of supply and demand, as contrasted with fallacious news, propaganda, misinterpretation, or manipulation.

Wheat growers in all countries seem to have arrived at the inference that the shifts in wheat price level from one crop year to another are frequently excessive, in view of underlying facts. Also, price fluctuations within the crop year have come to be regarded by growers as excessive, and in part artificial, in the sense of not being founded solely on considerations of supply and demand. These inferences have found reflection in the legislative halls of the countries most deeply concerned. Among the numerous elements in the business and political problem of wheat growing, the price level of wheat, and variations in wheat prices, have been of outstanding prominence.

The Federal Trade Commission, in the course of its extensive investigations of the grain trade, gave attention to the vari-

ability of wheat prices before our entrance into the war. Latterly, the Grain Futures Administration has given attention to fluctuations in wheat prices since the war, using a different method from that employed by the Federal Trade Commission. Comprehensive, long-term statistical studies are lacking—a rather curious situation in view of the importance of the commodity, but largely explained by the extraordinary complexity of the questions involved.

The following pages present an analysis and appraisal of variations in wheat prices, without pretension to exhaustive treatment in compilation or mathematical interpretation of data. What is sought instead is to present definitions of the variabilities involved, to indicate in a general way their occurrence and extent, and to arrive at such broad inferences as may be secured by an inductive method. The subject is in need of a thoroughgoing overhauling, but this can be undertaken only on the basis of source material collected with special reference to particular phases of the problem.¹

A comparison of the variability of wheat prices, contrasted with that of other commodities, will serve as a preliminary orientation. Following this, it will be necessary to consider the nature of the price quotations to be employed. We shall then distinguish the several kinds of fluctuations, or variations, in the price of wheat. We next consider the extent and amplitude of the variations of the three principal types, and the causal influences to which each may be attributed. Finally brief consideration is given to the variability of the farm price of wheat and to a comparison of pre-war with post-war variability. Since what we have to say on the comparative variability of wheat prices is designed merely to serve as a background, it may appropriately be included in the introduction.

THE COMPARATIVE VARIABILITY OF WHEAT PRICES

How variable is the price of wheat? It seems to be widely believed that the price of wheat is highly variable—not only highly

¹ For an interesting incursion into the subject, see V. P. Timoshenko, *Wheat Prices and the World Wheat Market* (Cornell University Agricultural Experiment Station Memoir 118), December 1928.

variable when considered by itself, but also highly variable when compared with the prices of other staple commodities. It is not difficult to show that this view borders on misapprehension.

Unless subject to regulation, the prices of all commodities display fluctuations—day-to-day, week-to-week, month-to-month, and year-to-year variations. The various commodities, however, display wide differences in the amplitudes and frequencies of their price variations. Some of the differences in variability are related to the physical and chemical constitution of the commodity; other variabilities of price are related to circumstances in primary production or ultimate consumption; still other variabilities of price originate in conditions in the channels of distribution. In the course of time, other things equal, the variations in the price of each commodity tend to evolve a type of price variation more or less characteristic of that commodity.

F. C. Mills' recent volume on *The Behavior of Prices* contains an extensive series of computations of price variabilities of many commodities over the period from 1890 to 1925. Table 1, prepared from these data, shows the measures of price variability, at wholesale, of twenty-four agricultural products, with corresponding measures for fourteen basic industrial materials to serve as contrast. Measures are given both for month-to-month and for year-to-year variability.

For wheat, the wholesale price of No. 1 Northern Spring wheat at Minneapolis was used. It is informative to observe that the month-to-month variability of the spring-wheat price was less than that observed with a considerable number of basic materials, including pig iron, steel billets, jute, brick, tar, and turpentine. Among the cereals, rice stood lowest in monthly price variability, with wheat next, followed by rye, barley, corn, and oats in the order named.¹ In respect to year-to-year variability of price, it is instructive to observe that several metals quite generally have displayed more year-to-year variability of

TABLE 1.—MEASURES OF PRICE VARIABILITY OF LEADING AGRICULTURAL AND INDUSTRIAL COMMODITIES, AT WHOLESALE*

(Per cent)

Commodity	Monthly variability 1890-1925 excluding 1914-21	Year-to-year variability 1890-1924
Rice	3.7	11.9
Wool: fine clothing	4.5	14.3
Wool: medium	4.9	15.3
Cattle: good to choice	5.0	9.8
Cattle: choice to prime	5.6	10.5
Wheat: spring	6.8	13.9
Hay	7.0	12.3
Beans	7.2	18.9
Flaxseed	7.7	17.9
Hogs: heavy	7.8	16.1
Hogs: light	7.8	16.0
Cotton	8.1	18.2
Hides	8.7	15.2
Rye	8.7	18.1
Barley	9.0	16.3
Corn	10.3	17.6
Oats	10.9	16.6
Sheep: wethers	11.5	12.9
Sheep: ewes	12.5	14.6
Milk	12.6	3.0
Hops	19.8	31.2
Eggs	23.1	8.3
Potatoes	26.4	39.4
Onions	28.4	32.3
Acid: sulphuric	2.9	10.8
Acid: muriatic	3.0	14.0
Copper: ingot	4.9	15.2
Silk: raw, Japanese	5.2	13.3
Zinc: slab	6.0	17.8
Glass: window	6.2	14.8
Rope	6.3	16.4
Steel billets	7.2	21.3
Brick	7.5	13.9
Pig iron: Bessemer	7.8	19.8
Tar	8.2	13.6
Jute	8.2	17.5
Turpentine: spirits of	8.9	19.6
Coke	13.9	36.3

* Data from F. C. Mills, *The Behavior of Prices* (New York, 1927), pp. 489, 491, 492, 493, 497, 499, 500, 501. Based on wholesale prices compiled by the Bureau of Labor Statistics and used in its index numbers. The figures for month-to-month variability are obtained, according to Mills, by calculating for each year the mean deviation of the monthly prices from the average price of the year, expressing this mean as a percentage of the average price for the year and then averaging the resulting percentages for the several years. The figures for year-to-year variability are obtained by computing the percentage changes of average annual prices from year to year and then calculating the average deviation of these percentages from their mean. The series of month-to-month and year-to-year variability are not comparable; one compares the articles with each other in each series.

¹ Cf. also Federal Trade Commission, *Prices of Grain and Grain Futures* (Report . . . on the Grain Trade, Vol. 6), 1924, pp. 27-28.

price than wheat. Among the cereals, rice again stands lowest, with wheat next, followed by barley, oats, corn, and rye in the order named.¹ From these computations we learn that wheat is not characterized by a relatively high degree of price variability: it is, after rice, the least variable of the cereals, and exhibits less variability, both month-to-month and year-to-year, than the prices of important basic materials whose

outturn is more or less controllable by management as well as independent of climatic influences.

In short, whatever the nature, frequency, and extent of variation of wheat prices, wheat is not a commodity that stands out on the basis of price variability. From this it does not follow, however, that such variability of price as does occur is therefore of secondary importance.

II. TYPES OF WHEAT PRICE VARIATIONS

The variations in wheat prices in terminal markets may be segregated, at least theoretically, into four principal types. One of these may be termed *inter-seasonal*, representing shifts in the wheat price level from one crop year to another. The others are *intra-seasonal*, representing (1) a recurring seasonal movement, (2) irregular variations extending over periods of weeks or months, and finally (3) short-term fluctuations from day to day and from week to week. These several variations are commonly construed as being of one order and are thus frequently criticized as alike adversely affecting the wheat grower's return. But they differ in the nature of the statistical data on which they are based, and in the implications contained. For the moment it will suffice to explain each type.

There are usually changes in the level of wheat prices from one crop year to another. If wheat were harvested, all over the world, in a single brief period, these shifts in level would be distinguishable far more easily than they now are. As it is, the great bulk of the world's wheat is harvested during June–September, a period of four months. Of the wheat harvested at other periods, only the harvests of Argentina and Australia are of outstanding significance, though sometimes India's harvest is an influential factor. Partly because of the length of this four months' period of harvest, partly because the prospects for harvests exert influences for weeks or months before harvest, partly because the final reckoning of the harvest cannot be made for several weeks, or even months, after the wheat is cut, the *inter-seasonal* price shifts, the changes in wheat price level from one crop

year to the next, are not easily defined. One may make an average of prices in a given crop year, but different observers will seldom agree in defining what might be termed the price level characteristic of that crop year. Nevertheless, the nature and the trend of the price difference between one crop year and another can usually be ascertained for each major class, even if its precise degree cannot, provided the study includes the movements in international markets. Not infrequently these inter-seasonal shifts are quite substantial. It is to these, in discussions of the depressing effects of "climatic" surpluses on prices, that attention ought to be particularly directed.

There are variations having a seasonal behavior. In each wheat-producing country, whatever its harvest period, prices tend to decline as new wheat moves to market, to reach a minimum some weeks later when the end-season shortage is entirely relieved and stocks begin to press upon storage or transportation facilities, then to rise during the rest of the season because of (but not in exact correspondence with) the cumulative cost of carrying charges—storage, interest, insurance, etc. Satisfactory statistical expression of this recurring seasonal movement of prices, in itself quite characteristic, is difficult to obtain. There are variations in the dates of harvest, the length of the harvest period, and the pressure upon farmers to sell their grain promptly. The recurring seasonal movement may be obscured by short-term and month-to-month fluctuations, next to be mentioned, which are difficult to separate from the seasonal variation proper. Also, an inter-seasonal wheat price change may exagger-

ate or minimize the seasonal wheat price movement. There is no doubt that such a recurring seasonal influence exists; but it is difficult to approximate it, for a single crop year, within reasonable limits of error, and averages are likely to yield unreliable results.

There are fluctuations arising from other than recurring seasonal influences which affect prices over periods longer than a week or two, and frequently cause movements of substantial proportions. These may be conveniently studied in month-to-month variations, although for certain purposes more refined data are necessary. These fluctuations, unlike the true seasonal movement, are likely to be irregular in occurrence, unequal in degree, and unlike in form. The causes, which are quite different from those which are responsible for recurring seasonal movements, are for the most part irregular changes in the actual and prospective market supply or demand, not only in the United States but on the world market. It is always more or less difficult to separate the month-to-month variations that are regional and temporary from those associated with the recurring seasonal price movement, a shift in wheat price level from one crop year to another, or changes due to the influence of a transient but extraordinary domestic or international circumstance. Looking back over a protracted period, one comes to the realization that pronounced month-to-month variations have usually arisen from exceptional causes.

Lastly, there are price fluctuations occurring within the trading day, from day to day, and over such brief periods as a week or two. These short-term fluctuations occur even in periods when visible influences are not pronounced; but they tend to be exaggerated when obvious factors are disturbing the level of wheat prices. They represent largely the joint results of temporary shifts in demand and supply for actual wheat, and the speculative and hedging dealings in futures contracts. These fluctuations lie for the most part within what Taussig has termed the "penumbra" of price-determining operations.

The four types of fluctuations are distinguishable in principle, but not readily

separable and measurable. The causes of the different types influence one another, and the results are so overlapping and interrelated that at times experienced persons would not agree in the differentiation of them. Wheats are so varied in quality, and the quantities of wheats of different qualities are so different from region to region, from year to year, and within a market, that the price situation is inevitably difficult of analysis.

SHORT-TERM VARIATIONS

It is possible to dismiss the short-term fluctuations with a few words, chiefly descriptive; for these short-term movements, broadly speaking, do not lend themselves to significant economic analysis except in connection with a refined study of what is sometimes called the technical position of the market, or with exceptional month-to-month variations. The day-to-day and week-to-week fluctuations may be considerable. The price movement of a day may be within a range of a cent up to several cents a bushel. A rise or decline of 5 cents in a week occurs occasionally; indeed, week-to-week fluctuations may be substantially larger. To a considerable extent they represent what may be called accidents or incidents in the "higgling of the market"; or a sort of surge and ebb, as of a tide, that is inevitable on every large market, even in the case of non-perishable products. They may, on the other hand, represent the initial steps or the progressive developments in a significant movement of longer duration, from month to month, or in the shift in the wheat price level from one year to another.

The short-term fluctuations of the wheat price are of almost infinite variety. The opening quotation may be the highest or lowest of the day, the closing quotation may be the highest or lowest of the day, a mid-session quotation may be the highest or lowest of the day; the price may rise after the opening of the market and decline before the close, or decline after the opening and rise before the close; the trend of the day may be upward or downward, or the fluctuation may resemble an oscillation. The variations on one day may be merely the repetition of the previous day; or the price may be tending to rise or fall. Some-

times the price will rise or decline precipitously; it may remain fairly constant for a few days, and then return to the point of departure. Oscillations may occur over several days.

These short-term oscillations are sometimes more pronounced for wheats deliverable on contract than for premium wheat, more often probably the contrary. The futures market may be overbought, or oversold, on a particular day, and readjustment is promptly enforced. Each price movement upward or downward extending over several days may be the beginning of a movement that will find expression in a change of the price for the month, or it may be wiped out by a corresponding reversion. Sometimes cash prices lead futures, probably more usually futures prices lead cash prices; the subject is of little importance in the present discussion. It is to speculation that the public ascribes most of the day-to-day fluctuations; but it is quite possible that such fluctuations might be more pronounced if the speculative forces were not in operation.

The day-to-day variations may be the steps in the change from one crop year price level to another, they may bring the average of the month higher or lower than that of the previous month, or they may balance each other to produce an average unchanged from the previous month.

Data are abundantly available for detailed study of short-time fluctuations. The daily records of transactions in the central markets are nowadays exceedingly complete. For each future there is the opening and the closing price, the highest and the lowest price.¹ Based on these futures, in the cash market there is the opening and the closing price, the highest and the lowest

price, sometimes an adjusted closing price, these quotations reproducing the variations in the prices of futures applied to the prices of wheat over the entire range of the several grades. The day-to-day variations in the weighted average cash prices, as computed from carload sales in each market, are usually less than the extreme variations within the grade shown in individual transactions. The variations in the prices of futures may be misleading in one way; the variations in individual cash transactions would be misleading in another way.

There are now available official computations of the daily average weighted cash price of wheat sold in several leading markets. Inasmuch as these do not represent all the transactions, and in particular do not include a large volume of purchases by mills, such computations are somewhat incomplete though probably not seriously misleading when considered regionally.

We have not, however, undertaken, nor do we for the present purpose consider it necessary, to tabulate and study the day-to-day or week-to-week variations in the prices either of cash wheat or of futures. In such variations operate so many transitory and unimportant influences that inferences drawn from them, in respect to price movements of significance, are subject to much error. The chief importance of day-to-day and week-to-week fluctuations lies in their particular value for the intensive study of exceptional month-to-month variations.

The other types of variation in wheat prices call for more extended analysis and discussion. Before this can be undertaken, however, it is essential to consider the character of the price material available and to select the data to serve as the basis.

III. THE CHARACTER OF THE WHEAT PRICE QUOTATIONS

If one were to ask what is the price of woolen cloth, the rejoinder would be—which woolen cloth? Similarly, an inquiry into the price of steel would lead to quotations for billets, plates, rails, and ingots. In any industry turning out a series of

products, one of them may be arbitrarily designated as a basis for price quotations. The same situation holds naturally for a raw commodity marketed in the state in which it was produced.

We may not confine ourselves to price variations of one grade of wheat in the United States, quite as if wheat were a

¹ There are also available the continuous quotations.

unity. Wheats of many different types, grades, and qualities are marketed side by side. The proportions of these varied classes in the total marketed supply vary greatly from year to year, within a year, and even from week to week. Consequently the prices of particular types, grades, and qualities sometimes vary considerably more than do average prices of all wheat marketed. The prices of durum wheat, which is largely used for purposes quite different from those of the bread wheats, follow a course peculiar to themselves; this is also true of Pacific wheats to a lesser extent. In certain years the prices of soft red winter wheat, which is not predominately a bread wheat, may be far out of line with

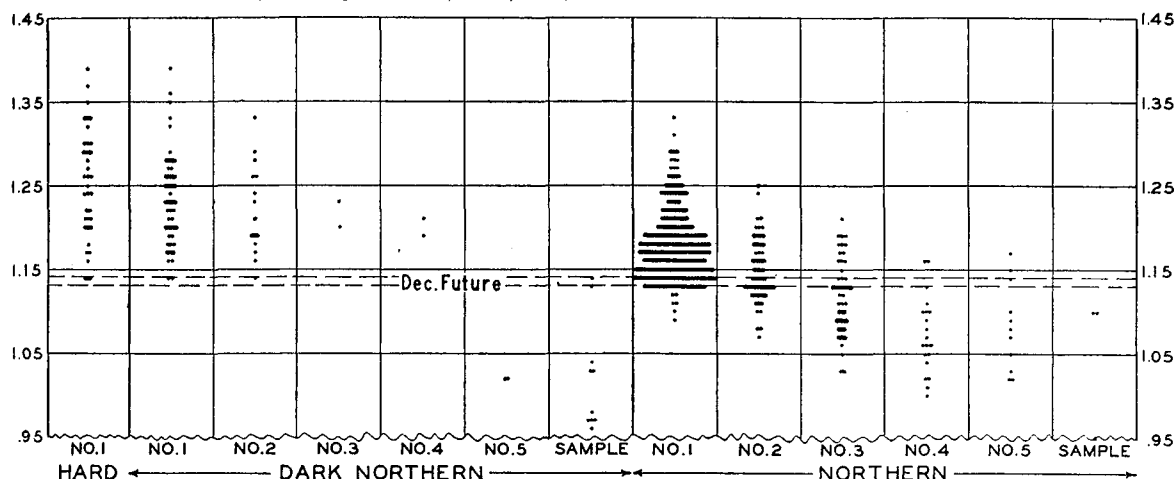
THE RANGE OF WHEAT PRICES

Since wheat, the commodity, is a group of entities with a range of qualities, so is the price of wheat a range. In addition to prices of cash wheat, we have quotations for futures. In a study of the variability of wheat prices, one must select such prices as are representative and comparable from year to year. Preliminary to a consideration of variations of the selected prices, it will be advantageous to secure an idea of the range of wheat prices.

As a condensed illustration of the range of prices on a single market, on a single day, within a grade and from grade to grade, Chart 1 is illuminating. It shows the

CHART 1.—CARLOT SALES OF SPRING WHEAT OF VARIOUS GRADES AT MINNEAPOLIS, OCTOBER 3, 1928*

(Dollars per bushel; one full space horizontally represents 40 cars)



* Data from *Daily Market Record*, Minneapolis, October 3, 1928.

those of other wheats. Even between hard spring and hard winter wheat, divergent price tendencies frequently appear. Moreover, the proportions of different grades and qualities of a single type of wheat differ so greatly from year to year that the course of prices of a standard grade may be quite unlike the course of average prices of all wheat of the type.¹ Premiums for wheats of high quality have a wide range, but the width of the range varies from year to year and from region to region.

¹ This is strikingly illustrated in the case of Canadian spring wheat. Cf. *WHEAT STUDIES*, March 1929, V, No. 5.

prices of all carloads of Hard Spring, Dark Northern Spring, and Northern Spring wheat of various grades sold on the Minneapolis market on October 3, 1928. On that day the December future varied between 113.1 and 114.2 cents. The extreme range of carlot prices was from 95 cents a bushel for a car of Northern Spring of sample grade to 139 cents for one car of Hard Spring and one of No. 1 Dark Northern. All of the Hard Spring, all of the Dark Northern Spring except two cars of No. 5 and eight cars of sample, sold at or above the contract price, nearly all of it above. Of the commonest grade, the standard contract grade

No. 1 Northern Spring, more sold at 114 cents than at any other price; and all but six carloads sold at 113 cents or more; but the range of price of carloads grading No. 1 Northern Spring was from 109 to 133 cents. Of the lower grades, each showed a fairly wide range, with median prices successively lower.

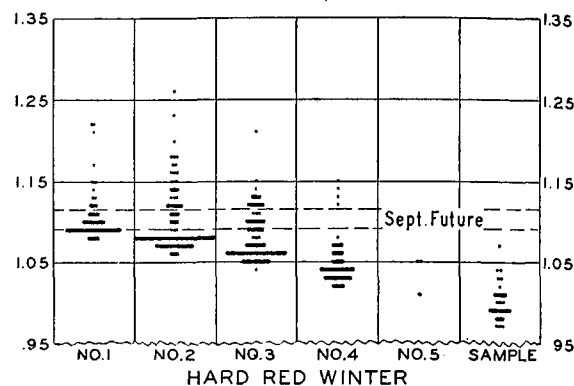
Chart 2 similarly shows the prices of carlot sales of hard winter wheat sold in Kansas City on August 3, 1928. The range was from 97 to 126 cents per bushel, with a September future varying from 109.1 to 111.5 cents. Here it is notable that a large amount of wheat sold below the low price of the September contract.

The isolated illustrations given are by no means extreme ones. For a view of the course of the range of wheat prices over a period of several years, it is convenient to resort to tabular comparisons covering only the upper grades of wheat. Table 2 gives a computation of the monthly average range of prices covering No. 1 to No. 3 spring

would obtain by using all carlot sales, but it covers the grades that are of major im-

CHART 2.—CARLOT SALES OF HARD RED WINTER WHEAT OF VARIOUS GRADES AT KANSAS CITY, AUGUST 3, 1928*

(Dollars per bushel; one full space horizontally represents 35 cars)



* Data from Kansas City Grain Market Review, August 3, 1928.

portance and the larger part of the wheat actually sold in that market.

TABLE 2.—RANGES BETWEEN HIGH AND LOW CASH CLOSING PRICES OF NO. 1 TO NO. 3 SPRING WHEAT AT MINNEAPOLIS, AS SHOWN BY AVERAGES OF FRIDAY PRICES*
(Cents per bushel)

Month	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	Average	
								All years	Omitting 1924-25 and 1927-28
September	20.4	19.2	19.0	23.0	29.2	19.8	31.4	23.1	21.5
October	21.0	19.0	19.0	26.0	37.0	20.2	35.2	25.3	23.2
November	18.7	19.0	18.8	28.5	33.0	15.5	37.0	24.4	21.0
December	18.0	17.2	17.8	32.5	27.7	14.8	43.6	24.5	19.1
January	18.2	30.0	19.2	41.2	29.0	15.0	51.2	29.1	22.3
February	19.2	28.0	20.2	40.2	27.7	17.0	51.0	29.0	22.4
March	20.6	27.5	22.2	38.0	25.8	17.5	51.8	29.1	22.7
April	19.0	29.8	23.7	39.3	19.2	17.2	54.7	29.0	21.8
May	20.8	27.5	25.8	31.0	17.2	19.8	51.0	27.6	22.2
June	22.6	31.0	28.0	22.2	19.8	24.0	43.8	27.3	25.1
July	29.2	34.0	30.0	23.2	31.8	25.8	41.5	30.8	30.2
August	26.2	23.3	26.8	25.8	26.0	26.8	31.8	26.7	25.8
Average	21.2	25.5	22.5	30.9	27.0	19.4	43.7	27.2	23.1

* Data based on prices obtained from Annual Reports of the Minneapolis Chamber of Commerce and from the *Daily Market Record* (Minneapolis). During 1921-22, 1922-23, 1923-24, and 1924-25 (with a few exceptions) the highest prices were for No. 1 Dark Northern Spring wheat; beginning with 1925-26 (with some exceptions) they were for No. 1 Hard Spring wheat. The lowest prices were usually for No. 3 Northern Spring, but occasionally for No. 1 Hard Montana and No. 2 Northern wheat. Occasional high prices for fancy Montana wheats have been disregarded in selecting the high prices.

wheat (Hard Spring, Dark Northern, and Northern) inclusive, at Minneapolis, during the crop years 1921-22 to 1927-28. Such a range is necessarily narrower than one

The price range changes from crop year to crop year, with variations in quantity and quality of hard spring wheat, and is influenced also by the conditions in the

winter-wheat crop. It is the expression largely of two factors: the spread from grade to grade and the extent of premium for protein. Over the past seven years this average monthly price range has varied from around 15 cents to over 50 cents per bushel. The range is most commonly narrowest in December, and widest in the spring or summer. But under exceptional circumstances, the range may be widest in the middle of the crop year, as was the case in 1924-25 and in 1927-28, or early in the crop year, as in 1925-26.

In the series are two exceptional years—namely, 1924-25 and 1927-28. These years were distinguished by extraordinary changes in the wheat price level and extreme width in the range of wheat prices. The averages of the period are thus somewhat exaggerated by including these two years. The column farthest to the right gives the averages for the period excluding these two exceptional years. This indicates a monthly average range varying from 19.1 to 23.2 cents during September-May, and rising to 25.1-30.2 cents in the three months toward the close of the spring-wheat crop year. If the exceptional month of October 1925 is eliminated, it is clear that the range is narrowest in the months of September-December, somewhat higher in January-May, and higher still in June-August.

A similar range of prices exists for hard red winter wheat and for soft red winter wheat, though each tends to be smaller than the range in spring-wheat prices. From these price ranges one gathers the important information that cash prices of different parcels of millable wheats, even within the grades deliverable on futures contracts, may vary from 15 to 50 or more cents per bushel in a single market at a given time. The point is additionally illustrated, for a different market, in a recent study presenting a weighted average of cash wheat prices at Winnipeg.¹ It may be added that the Canadian wheat pool payments for deliveries from the 1927 crop ranged from \$1.42 $\frac{1}{4}$ for No. 1 Manitoba Northern, to

\$0.58 $\frac{1}{4}$ for a low-condition low-grade mixed wheat.²

The significance of this fact for a discussion of wheat price variability is twofold. It not merely reveals the difficulties that one must encounter in determining what quotations to use for a wheat price series in attempting to measure variability. It also implies that the wheat market is so highly selective, with respect to quality, that great diversity in prices of different lots of wheat occurs entirely apart from fluctuations in the general level of wheat prices. Two wheat growers selling on two successive days may get quite different prices, not so much because of price fluctuations as because their lots differ so greatly. Prices of particular qualities may easily vary more, from day to day, from month to month, and from year to year, than the level of wheat prices as a whole. Since the differentiation of wheat qualities is carried much farther today than it was before the war, the variations in price experienced by an individual grower may be much larger today than in pre-war years, even without any increase in fluctuations of the level of wheat prices.

PRICE CLASSES OF WHEATS

The merchandising of wheat (disregarding in this discussion Pacific wheat and durum wheat) has been restandardized since the war, partly on the basis of federal grades but predominantly on the basis of qualities not included in the specifications of the federal grades. The cash wheats may now be grouped into premium wheats, wheats deliverable on contracts, and wheats not deliverable on contracts. The three classes overlap somewhat and in each region shift from year to year. An appraisal of the effective price classes of wheats will make clear certain characteristics of the wheat market situation as related to the purchasing practices of the chief proximate consumers, the flour millers.

Premium wheats are of two groups: what may be called super-grades, and high-protein wheats. The super-grades are the federal grades above those specified as the basis of delivery on contracts. The premiums for protein (graduated according to protein content) apply to both spring and

¹ Cf. WHEAT STUDIES, March 1929, V, No. 5, especially p. 187.

² J. E. Boyle, *Marketing Canada's Wheat* (published by Winnipeg Grain Exchange, 1929), p. 29.

winter wheats, within any grade, almost, but varying from year to year. The second class of wheats comprises those deliverable on contracts. On the Chicago market, seventeen wheats of three varieties are now deliverable on contracts—seven at the contract price, four at premiums, and six at discounts. The number is smaller on the other markets. Details are shown in Appendix Table I for the four principal wheat markets of the United States. The third class of wheats, those not deliverable on future contracts, includes various inferior varieties and grades, also mixed wheats, variously sold on sample if sold from the farm at all.

The premium wheats are consumed largely in the United States in the manufacture of superior flour for domestic consumption, of which but a small amount goes abroad to special markets. Premium wheats are seldom exported nowadays, since importing countries can usually secure the same qualities in wheats from other exporting countries, without paying the premiums prevailing here. Wheats deliverable on contracts are used in the manufacture of standard American flours for domestic consumption, usually blended with premium wheats. Wheats of straight contract grade go more or less freely to export, especially winter wheats, durum, and Pacific wheats. Flours ground from wheats deliverable on contracts enter export markets more or less freely, according to the season. Wheats not deliverable on contracts go in part into export wheat, and in part are ground to some extent into flour for the export market, and may indeed be used sparingly in blends ground for the domestic market. Much of such wheat goes into feed.

It is important clearly to understand what is involved in the composition of the several flours. We have flours of pure type, i.e., ground from one type of wheat, though not necessarily from one variety of wheat within the type. Thus, we have hard spring-wheat flour, hard winter-wheat flour, and soft red winter-wheat flour. Hard spring-wheat flour is ground largely from Marquis wheat, but includes Fife and other standard varieties and may even include Kota and durum wheat. Hard winter-wheat

flour is ground largely from Turkey Red or Kanred wheat, but may include Blackhull or other hard winter-wheat varieties. Less specified relations hold for soft red winter-wheat flour. Secondly, there are mixed-type flours, ground from blends of winter and spring wheats, varying from region to region and from season to season. These mixed flours are for some uses not so good or so uniform as pure-type flours; but for other purposes they may be quite as satisfactory. Flour millers, in short, blend varieties of wheat within the types of wheat and also blend the wheats of different types, in accordance with varying circumstances.

The miller makes his own blends, and he cannot use blends representing a cross section of the contract market. If a miller, under the seller's option, were to take deliveries on the Chicago market, he might receive any one or several or all of seventeen grades of wheat of three types, not alike in milling values in any two deliveries.

It is the general objective of mixing operations in terminal markets to secure the largest possible volume of wheat meeting the federal grades directly deliverable on contract. These may be termed basic wheats; in the price structure of a wheat crop, the premium wheats are superimposed upon this basis. There is, however, no such thing as comparable grades of flour, i.e., grades of flour representing each year the deliverable grades of wheat as they are mixed in terminals to meet the specifications of the federal grain act. In other words, there is practically no flour as of the grade of wheat, but most flours are blends from the grade standpoint; and a particular flour, even a high-grade flour, may contain varying amounts of wheats whose prices are as far apart as 50 cents a bushel. Flours produced remain fairly stable with respect to quality from year to year, but wheats produced do not.

The substantial variations in prices in a single market at a particular time, already mentioned, naturally encourage the mixing of wheats with a view to obtaining the best returns for the heterogeneous lots in hand; and similar considerations call for the exercise of keen judgment on the part of millers, who seek to obtain that combination of wheats from which they secure desired

flours which will yield the maximum net returns. Many millers prefer to select their wheats in the country or in the terminal market before wheats are mixed, and thus to make up their own combinations. Apart from this, the mixing of wheats to make the best of the specifications of the federal grades is well-nigh universal in this country, among wheat pools as well as commercial grain dealers; and it may be regarded as an inevitable consequence of variations in wheat and the existence of statute grain standards. In Canada such mixing is practiced by line elevators, farmers' elevators, and the pools; indeed one objective of the Campbell amendment to the Canadian Grain Act was to permit the growers to obtain the profits of terminal mixing. Just now, there is in Canada a conflict on policy, some desiring to limit mixing to wheats within the grade. It is against the practice of mixing wheat so as barely to make the grade ("skinning the grade," as it is sometimes termed in grain circles) that European importers have raised strenuous protests in recent years. But it is universal practice, when marketing a product under specifications, to meet the specifications but not to exceed them.

There is some inconsistency, however, between the efforts to secure full values for premium wheats and the efforts to secure full profits of mixing. The larger the amount of wheat sold on protein content and weight per bushel, the smaller the amount available to strengthen poorer wheats. The more that high-grade wheats are stretched with low-grade wheats in order to grade No. 2, for example, the less high-grade wheat will be available for sale on the sample market. The interests of grain dealers and of flour millers are frequently divergent and the mixing of wheats in terminals has driven many millers to country buying of wheat in the United States.

SELECTION FOR STUDY OF VARIATIONS

Cash wheat quotations, though based since 1917 on the federal grades, are nevertheless of a conspicuously heterogeneous nature. For the experienced men of the trade it is not difficult to designate within the range those quotations that are of most

significance. Though there is considerable difference of view between millers and grain merchants, agreement could probably be secured on the quotations to be regarded as representative in the commodity sense. Nevertheless, the fact that the reported closing cash price quotations on the Minneapolis Exchange represent the judgment of a price committee, whereas on the Winnipeg Exchange these correspond to quoted transactions, illustrates for this country the need for interpretation, even within the trade.

Cash prices may be either by sample and on test or of the grade. In a year of customary quality in Canada, the cash grain prices at Winnipeg represent elevator-run wheat, as of the grade, at Fort William and Port Arthur. In a year of sub-standard quality, such as 1928-29, notations also appear of selections within the grade, with occasional indications of premium on protein. In the American markets (disregarding Pacific and durum wheats) the amount of wheat sold in terminal cities as elevator-run of the grade is declining; more and more, specifications of quality are applied to the grade. This development is most pronounced on the Minneapolis market and for spring wheat in general; but it is becoming the established practice in the hard winter-wheat region. In the case of soft winter wheat, the regional and local variations are so pronounced that purchase by millers on sample is highly developed, though it rests on considerations other than protein content.

What is today to be regarded as representative practice in the hard wheat regions is to have the cash price quotations based on four factors: the federal grade of the type, the protein content, admixture of deleterious components, and the futures price of the day. As an illustration may be given the price range at Minneapolis on December 5, 1927, as expressed in the trade press, on wheat grading No. 1, based on protein, as follows, in terms of premiums over the December future:

14	per cent—30 to 38	over December
13½	per cent—25 to 32	over December
13	per cent—20 to 26	over December
12½	per cent—13 to 18	over December
12	per cent—8 to 12	over December
11½	per cent—3 to 6	over December

This illustration is rather extreme, even for spring wheat, and the range of prices within a grade is usually less for hard winter wheat than for hard spring wheat. The variations of 3 to 8 cents between wheats of the same protein content are the consequence of deleterious components or particular milling characteristics.

Under such circumstances, how shall one express statistically the price of cash wheat? On each market daily is a range of bids; at the close of each day are the reports of carlot sales at different prices. Obviously the sales constitute the most representative basis for the cash prices of the day. If for each market one obtains the sales by carload lots with the prices for each deal, one secures the weighted cash price of wheat for the day in that market.¹ The several markets in a region dealing with the same kind of wheat will exhibit somewhat varying prices for the same wheats, depending on circumstances of transportation and other factors. It is customary and convenient to select one market as representative of a type and region.

Minneapolis is the representative market for hard spring wheat. Into the other two prominent markets, Duluth and Chicago, pass the spring wheats that have filtered through the Minneapolis market. By this we mean that the millers buying on the Minneapolis market make the earliest appraisal of the characteristics of the oncoming flow of wheat and have the first selections from among the daily receipts; for the most part, what passes to Duluth

and Chicago are the (flour) wheats that have failed to impress the Minneapolis buyers with their desirability.²

In the case of the hard winter wheats, Kansas City is the controlling market. Though from the milling point of view the interior markets, extending from Wichita south, may be regarded as more representative, nevertheless hard winter-wheat prices may still be best judged by the Kansas City quotations.

On the Kansas City market premiums for protein are quotable in six divisions, ranging from below 11.5 per cent to 14 per cent protein and above. In the second week of March 1929, in a season of low premiums for protein, the following prices for hard winter and hard spring wheats were quoted:

Percentage of protein	Kansas City	Minneapolis
14	4-7 cents over the May	15-20 cents over the May
13	1-3 cents over the May	5-10 cents over the May
12	2 cents under to the May	1 cent under to 1 cent over the May

In the case of soft red winter wheat, the choice lies between St. Louis and Chicago, with St. Louis at present the preferable market for cash quotations. Since nothing in soft red winter wheat corresponds, in reliability as a measuring stick, to protein content in the hard wheats, the cash prices for the different soft red winter wheats are not as comparable as are those for the hard wheats.

In connection with soft red winter wheat, it must be kept in mind that this crop runs much less true to type than do hard winter and hard spring wheats. In the hard spring-wheat crop, Marquis wheat is prominent; in the hard winter crop, Turkey Red and Kanred wheats are outstanding; no variety is correspondingly prominent in the soft red winter-wheat crop. Regional characteristics are prominent in the soft red winter-wheat crop; in the terminals this wheat is therefore usually of mixed varieties. Under these circumstances, the milling characteristics are less sharply defined; but at the same time, the proportion of the crop grading No. 2 is subject to wide variations.³

It is on the basis of considerations indi-

¹ Subject to the qualification that some cash sales are made out of elevators and from the country.

² To some extent, it is alleged in Montana, the Montana spring wheats do not meet with representative quotations in the cash markets of Minneapolis.

³ The following situation existed in 1924, according to J. Allen Clark ("The Registered Varieties of American Wheat: Their Class, Origin, and Acreage," *Journal of the American Society of Agronomy*, November 1927, XIX, 953-1040): Of hard spring wheat, 39 varieties were registered, of which 20 were grown commercially; Marquis was the leading variety, followed by Kota, Preston, Ruby, Red Fife, and Bluestem. Of hard winter wheat, 26 varieties were registered, of which 17 were grown commercially; Turkey (Kharkof) was the leading variety, followed by Kanred, Blackhull, Michikof, and Minturki. Of soft red winter wheat, 85 varieties were registered, of which 58 were grown commercially; the leading varieties were Fulcaster, Fultz, and Poole, followed by Mediterranean, Trumbull, Leap, and others with about the same acreage.

cated above that we propose to use weighted averages of cash sales instead of bare quotations for cash wheat or wheat futures. Exporters purchase wheat on grade, but millers purchase wheat on flour values. There is of course a continuous interaction between the prices of wheat futures at home and abroad and the premiums and discounts on cash markets resulting from variations in milling quality. Wheat cannot be defined in a sentence, a grade cannot be stated in a word, and a price cannot be given in a figure. It is not inept to describe the price of wheat as a "no man's land" between the contending forces of supply and demand, which is continuously being pushed forward or forced backward and is widened or narrowed with variations in forces or tactics of the opposing price combatants.

The United States Department of Agriculture computes as representative of the respective wheats the weighted average prices per bushel of reported carlot sales of No. 1 Northern Spring wheat at Minneapolis, No. 2 Hard Winter wheat at Kansas City, and No. 2 Red Winter wheat at St. Louis. These figures go back to 1899, and constitute the most serviceable data now available. Since 1918-19 are also reported weighted average prices for combined markets; but for purposes of interpretation, it is better to use prices in the individual markets, because they are more homogeneous and extend back over a considerable pre-war period.

It is to be emphasized that the weighted average prices of these important wheats at Minneapolis, St. Louis, and Kansas City since the war are not directly comparable with the corresponding weighted average prices covering the period 1899-1914. The grading has been influenced by the federal Grain Standards Act, which came into effect in 1917; the characters of the wheats have been changing, and despite introduction of improved varieties, signs of deterioration are everywhere in evidence; flour standards have changed over the past two decades, for the most part in response to changes in large-scale methods of making bread; premiums on protein were little known before the war; the range of prices of a variety of wheat on the cash grain market tends to be

much wider since the war than it was before the war. All in all, the definition of a representative wheat, and the determination of its price, have become more difficult since the war. Nevertheless, the data selected are reasonably satisfactory for the purpose in hand.

The seven crop years from 1914-15 to 1920-21 constitute a period of abnormal price influences connected with the war, with radical shifts in the general level of prices. If we regard the post-war deflation of prices as having been completed with the crop of 1920-21 (that is, on June 30, 1921), there are but seven post-war years, ending with June 30, 1928, in which such extraordinary influences were absent. With these seven may be compared fourteen pre-war crop years, closing June 30, 1914. In view of all the circumstances, the pre-war period available is none too long; and the seven post-war years constitute a period so short as to enforce precaution in interpretation.

To supplement this material, and also to serve as a contrast, other price series seem desirable. Of the various series available, we have selected four. One is the American values of exported wheat. The declared value handed in by the exporter corresponds to the f.o.b. price of wheat, port of embarkation. Since the American prices for purposes of this study are primarily related to the European prices, we have used in this series only the prices of wheats exported to Europe.

Another series represents the average price per bushel of daily cash closing prices of No. 1 Manitoba Northern wheat at Winnipeg. This series does not extend back earlier than 1909, because of lack of closing cash quotations prior to that date. We have, therefore, available only a short period of five years before the war and the seven-year period 1921-28.

Finally, we employ two series of British wheat prices. The first series represents the average spot price per sixty-pound bushel of good average quality imported red wheat at Liverpool.¹ The second series

¹ It will be recalled that, outside of American and Canadian wheats which are purchased on grade, all wheat entering the United Kingdom is purchased in country of origin on sample or specification. The component wheats vary substantially in quality from season to season.

represents the declared values of imported wheats into the United Kingdom and is therefore a weighted average price of all wheats imported. Before the war, sterling and the dollar fluctuated very slightly in relation to each other; therefore the pre-war British figures have been converted into American currency at par. The British figures for that portion of the post-war period when sterling was depreciated have of course been corrected for fluctuations

in exchange and the prices are therefore on terms of parity with the dollar.

The four American price series and the series of British import prices are weighted prices; the Winnipeg and the spot Liverpool prices are unweighted arithmetic averages of prices. Thus, the seven series are not strictly comparable; but for the purpose of comparison of month-to-month variations, it is improbable that any material error may thus have been introduced.¹

IV. MONTH-TO-MONTH VARIATIONS

In the appraisal of wheat prices over a considerable period, the month represents the shortest time in which significant changes in the wheat price can be conveniently studied. The month-to-month variations, however, contain several components, and these should be carefully distinguished. Whenever the price level of a crop year changes from that of the previous crop year, such change is rarely sudden, though the transition may be step-like on one occasion and more precipitous on another. Within the month-to-month variation is also included the recurring seasonal price movement to be discussed below. If the seasonal movements and changes in the crop-year price level were both eliminated from consideration, there would still remain month-to-month fluctuations of greater or lesser magnitude, depending on circumstances. Sometimes, as we have observed, it is necessary to study the day-to-day fluctuations in order to appraise a month-to-month variation. In this section, however, we consider the month-to-month variations as they emerge from the price data we employ, without adjustment for inter-seasonal variations or elimination of the recurring seasonal movement.

Statistically, we are in position to view and appraise month-to-month variations on the basis of fairly representative material, because the official compilations of averaged prices of reported cash sales at the principal markets extend back to 1899. For reasons indicated in the preceding section, it seems best to use the monthly weighted average prices of reported cash sales of three representative wheats, namely, No. 1

Northern Spring at Minneapolis, No. 2 Red Winter at St. Louis, and No. 2 Hard Winter at Kansas City; and to study three seven-year periods—1900-07, 1907-14, and 1921-28. For supplementary series we have used the series of unweighted monthly averages of the Winnipeg prices of No. 1 Manitoba Northern since 1909, the series of unweighted monthly averages of good average quality imported red wheat at Liverpool, and the series of weighted average prices of wheats imported into the United Kingdom, since 1900. All of these latter are expressed in terms of American money.

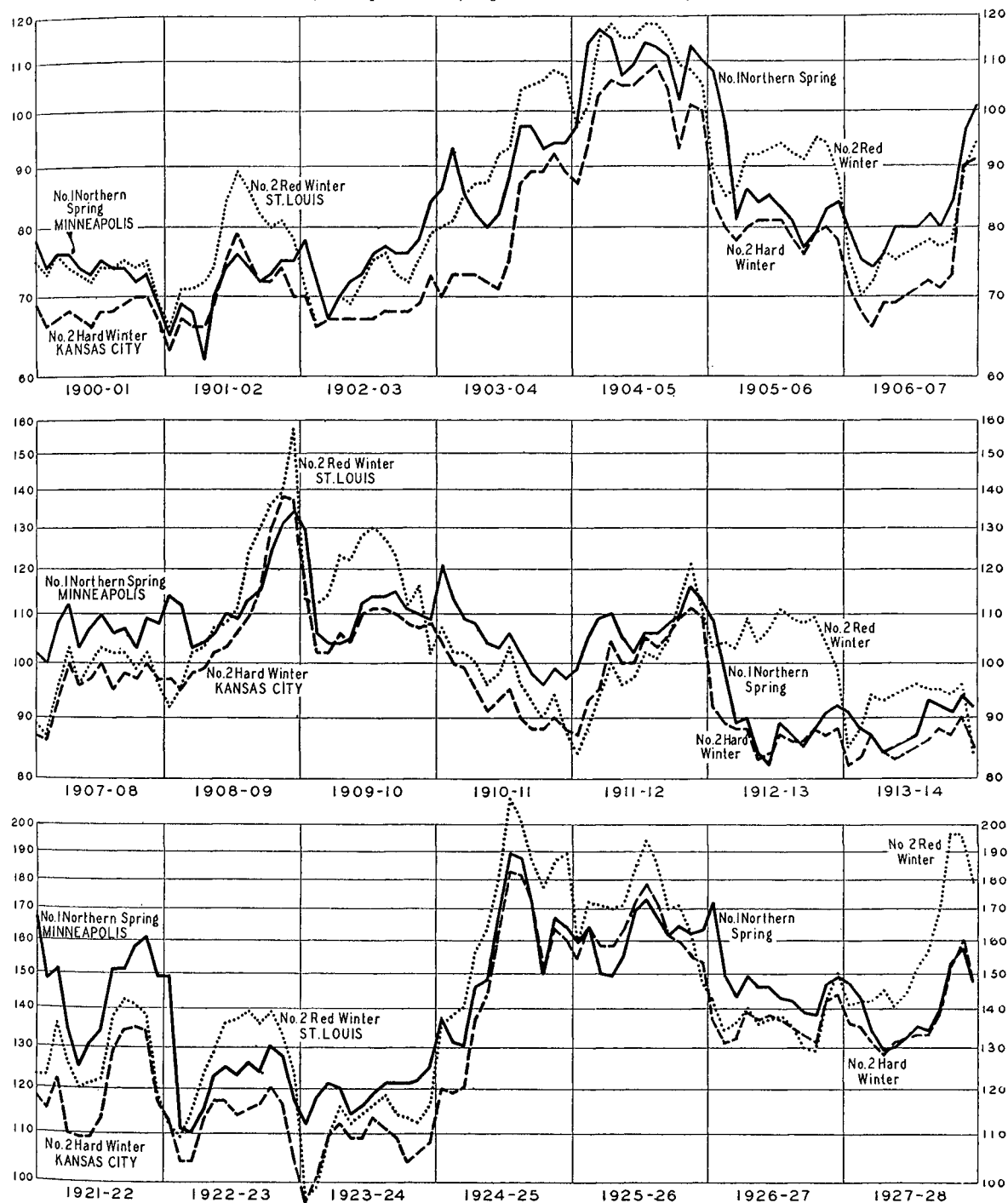
In considering month-to-month variations (i.e., from one month to the next) we use monthly average prices, as described. Later, in the consideration of year-to-year variations, we adjust yearly average prices for changes in the general price level. This might also be done for the study of month-to-month variations, by adjusting each wheat price of the month on the basis of the all-commodity wholesale price index number of the month. For the present purpose, this refinement seems unnecessary, since the adjustments would have only a slight effect on month-to-month variations.

The basic data are given in Appendix Tables II-VII. In Chart 3 we have presented the three American series in graphic form. A logarithmic vertical scale is used in order to render the variations comparable on different levels of prices. Since we

¹ The statistical material is contained in Appendix Tables II-VII. Of the seven series, the series of American export prices is not presented in the form of monthly data, since this series finds no use in the study of month-to-month variations.

CHART 3.—WEIGHTED AVERAGE PRICES OF REPORTED CASH SALES OF THREE REPRESENTATIVE WHEATS, MONTHLY, FROM JULY 1900 TO JUNE 1914, AND FROM JULY 1921 TO JUNE 1928*

(Cents per bushel; logarithmic vertical scale)



* Data in Appendix Tables II-IV.

are not here concerned with the course of wheat prices over the periods studied, no extended discussion of the chart is called for. It serves mainly as part of the back-

ground of the consideration of month-to-month variations. In passing, however, it is worthy of remark that the three series plotted show considerable divergence one from another.

The tables of monthly variations have been set up in the form of deviations of the price of one month from the price of the previous month. (Appendix Tables VIII-XIII.)

In using the tables of month-to-month price variations, it is to be kept in mind that these are useful for the study of variations but not for the study of values. The wheats involved are substantially different. The spot price of red wheat at Liverpool probably applies to wheat approximately comparable with No. 2 Hard Winter; but No. 1 Manitoba Northern is much superior to No. 1 Northern Spring, or to the average of red wheat at Liverpool, and is both superior to, and different in type from, No. 2 Red Winter wheat at St. Louis.

COMMENTS ON VARIATIONS REVEALED

Both Chart 3 and the tables of deviations suggest, entirely in conformity with trade experience, that crop years may be divided into commonplace years and exceptional years. The exceptional years are characterized by wide changes in prices within the year, the result of crop scare or some particular untoward circumstance, or of marked change in the price level from one crop year to the next. Under such circumstances occur the wide month-to-month variations that are to be seen in the figures for 1904-05, 1905-06, 1908-09, 1909-10, 1921-22, 1924-25, 1925-26, and 1926-27.

Looking over the tables of variations in wheat prices on the American markets, one is struck with the relative indistinction of variations in the majority of months. But in each period were exceptional years displaying extreme variations in wheat price from one month to the next. The highest month-to-month variation in the first seven-year period was 17 cents (spring wheat, July-August 1904 and August-September 1905; and hard winter wheat, April-May 1907); in the second period it was 44 cents (soft red winter wheat, June-July 1909); and in the third period, 38 cents (spring wheat, July-August 1922).

Usually, but not always, wide deviations were simultaneously displayed at all three American markets. In the 84 months of the period 1900-07, the number of monthly deviations of 10 cents or more was five at Minneapolis, seven at St. Louis, and four at Kansas City. In the 84 months of the period 1907-14, the number of deviations of 10 cents or more was three at Minneapolis, eight at St. Louis, and four at Kansas City. In the 84 months of the period 1921-28, pronounced deviations occurred much more frequently than in the pre-war period; variations of 10 cents or more occurred seventeen times at Minneapolis, twenty-three times at St. Louis, and eighteen times at Kansas City. If one regards a deviation of 15 cents or more since the war as corresponding to a deviation of 10 cents or more before the war, the difference is still conspicuous; variations of 15 cents or more occurred eleven times at Minneapolis, fourteen times at St. Louis, and eight times at Kansas City in the post-war period.

When the frequency distributions of month-to-month changes in wheat prices are studied, no peculiarities deserving special attention are evident. As the data are presented in Table 3, it appears that zero changes are less common, relative to changes of 1 or 2 cents, upward or downward, than would ordinarily be expected, but this is a consequence merely of the fact that we have had to use figures in which fractions have been rounded off to even cents. Allowance being made for this fact, it appears that the smallest month-to-month changes are the most common, that the bulk of the changes fall within moderate limits, and that large changes occur only infrequently.¹ If attention be given to the direction of the changes as well as to their size, it appears that the large changes are somewhat more commonly negative than positive, but the tendency is slight. The distributions are found to approximate closely the so-called normal form. They differ from the normal chiefly in showing an excess of very large changes, the number of changes exceeding four times the semi-interquartile range being about twice that

¹ In general, these observations apply to the variations in the other price series presented in Table 6.

TABLE 3.—NUMBER OF MONTHS SHOWING INDICATED CHANGES ABOVE OR BELOW PRICE OF PREVIOUS MONTH, OF NO. 1 NORTHERN SPRING WHEAT AT MINNEAPOLIS, NO. 2 RED WINTER WHEAT AT ST. LOUIS, AND NO. 2 HARD WINTER WHEAT AT KANSAS CITY, 1900-07, 1907-14, AND 1921-28*

Change above or below pre- vious month (cents)	No. 1 Northern Spring wheat at Minneapolis			No. 2 Red Winter wheat at St. Louis			No. 2 Hard Winter wheat at Kansas City		
	1900-07	1907-14	1921-28	1900-07	1907-14	1921-28	1900-07	1907-14	1921-28
0	8	3	5	6	3	3	18	7	6
1	13	21	10	29	17	14	21	23	14
2	24	15	13	10	7	7	12	15	11
3	7	11	13	14	12	9	14	11	7
4	11	14	3	7	11	7	9	11	8
5	5	2	6	6	8	4	1	6	5
6	4	6	10	4	9	4	1	3	5
7	2	3	1	1	3	4	2	2	3
8	3	2	1	..	4	3	1	1	4
9	2	4	5	..	2	6	1	1	3
10	1	..	..	2	1	4	..	..	3
11	1	1	1	2	1	..	1	..	1
12	1	1	2	..	1	..	1	1	4
13 .....	..	..	..	1	1	5	..	..	1
14 .....	..	..	3	1	2	..	..	..	1
15 .....	..	..	..	..	..	2	..	1	..
16 .....	..	..	2	1	..	4	1	..	2
17	2	..	3	..	..	1	1	1	2
18 .....	..	..	1	..	1	..	..	..	..
19 .....	..	..	1	..	..	1	..	..	1
20 .....	..	..	..	..	..	1	..	..	3
Over 20 .....	..	1	4	..	1	5	..	1	..
Total	84	84	84	84	84	84	84	84	84

* Based on data in Appendix Tables VIII-X.

to be expected in a strictly normal distribution.

The more important facts to be gathered from a study of the month-to-month

changes are most readily observed in the averages. Table 4 shows the average month-to-month price change for each class of wheat in each of three seven-year periods.

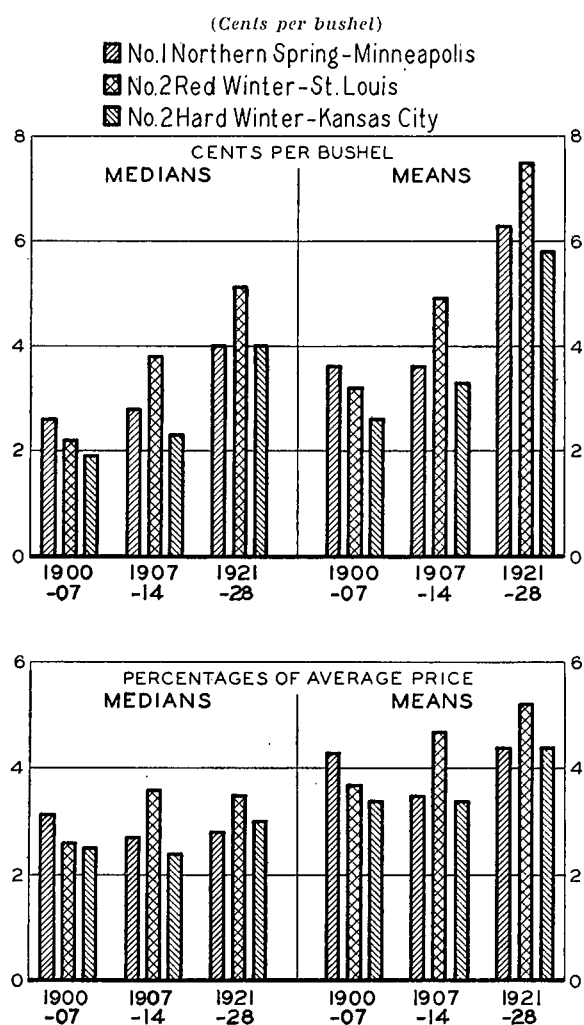
TABLE 4.—AVERAGES OF MONTH-TO-MONTH CHANGES IN WHEAT PRICES, BY PERIODS AND BY CLASSES OF WHEAT*

Changes	1900-07				1907-14				1921-28			
	No. 1 North- ern Spring Minne- apolis	No. 2 Red Winter St. Louis	No. 2 Hard Winter Kansas City	Aver- age	No. 1 North- ern Spring Minne- apolis	No. 2 Red Winter St. Louis	No. 2 Hard Winter Kansas City	Aver- age	No. 1 North- ern Spring Minne- apolis	No. 2 Red Winter St. Louis	No. 2 Hard Winter Kansas City	Aver- age
Median change (cents per bushel)	2.6	2.2	1.9	2.2	2.8	3.8	2.3	3.0	4.0	5.1	4.0	4.4
Mean change (cents per bushel)	3.6	3.2	2.6	3.1	3.6	4.9	3.3	3.9	6.3	7.5	5.8	6.5
Average price (cents per bushel)	83.9	85.5	77.2	82.2	103.4	104.3	97.4	101.7	142.1	143.8	132.5	139.5
Median change (per cent of average price)	3.1	2.6	2.5	2.7	2.7	3.6	2.4	2.9	2.8	3.5	3.0	3.2
Mean change (per cent of average price)	4.3	3.7	3.4	3.8	3.5	4.7	3.4	3.8	4.4	5.2	4.4	4.7

* Based on data in Appendix Tables II-IV and VIII-X.

Chart 4 shows these graphically. Both the arithmetic means of the changes and the medians are shown. In the upper part of Chart 4 the averages are shown graphi-

CHART 4.—AVERAGES OF MONTH-TO-MONTH CHANGES IN WHEAT PRICES, BY PERIODS AND CLASSES OF WHEAT*



* Data in Table 4.

cally. Because of the appreciable number of exceptionally large changes, the medians probably constitute a somewhat more stable and trustworthy form of average than the arithmetic means. The general showing of both types of average is similar, however, each supporting the other as evidence.

These averages reveal clear differences in price variability between the three wheats in the United States markets. In each

period and judged by either average, the smallest variability is shown by No. 2 Hard Winter wheat at Kansas City. Only in one case does another wheat show equally low variability: the median change (but not the mean) for No. 1 Northern Spring wheat at Minneapolis in 1921-28 is the same as for No. 2 Hard Winter at Kansas City. In the last two periods, judged by either average, the greatest variation is shown by No. 2 Red Winter wheat at St. Louis. In these two periods, No. 1 Northern Spring at Minneapolis resembles No. 2 Hard Winter in respect to variability more than No. 2 Red Winter. In the first period, 1900-07, No. 1 Northern Spring shows the greatest variability, with No. 2 Red Winter standing midway between No. 1 Northern Spring and No. 2 Hard Winter.

The month-to-month price variability of the three wheats as thus shown stands roughly in the same relation as their price levels. The last two lines of Table 4 and the lower portion of Chart 4 show the measures of variability expressed as percentages of the average prices for the periods. It is clear from these that the differences in level of prices of the three wheats only in small measure account for the differences in variability. In terms of percentage of average price, the variability of No. 2 Hard Winter stands relatively somewhat higher than before, so that for the period 1921-28 it appears slightly greater, when judged by the medians, than the variability of No. 1 Northern Spring. For the two earlier periods No. 2 Hard Winter still shows the smallest variability among the three wheats. No. 2 Red Winter still stands highest in respect to variability in the last two periods and No. 1 Northern Spring highest in the first period.

The variability, period by period, is most conveniently studied in terms of averages for the three classes of wheat. For the period 1900-07 the medians of month-to-month changes for the three classes of wheat average 2.2 cents; for 1907-14 the average is 3.0 cents; for 1921-28 the average is 4.4 cents. Little significance can properly be attached to such averages individually, but their relations, one to another, are worthy of some attention and furnish one convenient indication of the variability of

wheat prices period by period. Substantially the same picture is given by the averages of the arithmetic means, which are, in order for the three periods, 3.1, 3.9, and 6.5. As one considers the variability in prices of each grade from period to period, there is found no case of decreased variability in a later period. The means show No. 1 Northern Spring as variable in 1907-14 to the same extent as in 1900-07. Even in this case an increase in variability in the later period is shown by the medians.

The progressive increase in month-to-month price variability from 1900-07 to 1921-28 seems roughly proportional to the increase in the level of wheat prices from period to period. When the measures of variability by periods are expressed as percentages of the average prices for the periods, as in the last two lines of Table 4, the regular increase in average variability of each wheat from period to period disappears. No. 1 Northern shows its greatest variability in the first period, if judged by the medians; in the last period, if judged by the means. No. 2 Red shows its greatest variability in the second period, if judged by the medians; in the last period, if judged by the means. No. 2 Hard shows its greatest variability in the last period, whether judged by medians or means. The medians probably furnish the more reliable basis for judgment. They suggest that the price variability of No. 1 Northern, expressed as a percentage of the average price, was greatest in the period 1900-07 and has since been less; that the price variability of No. 2 Red Winter was low in the period 1900-07 and has since been greater; and that the price variability of No. 2 Hard increased in 1921-28 considerably above that shown in the two previous periods. These differences in variability from period to period are not great, however, and may not be regarded as more than suggestive. Certainly the data offer no support to any theory that the variability of wheat prices expressed as a percentage of the price has changed greatly since 1900:

Some semblance of uniformity appears in the seasonal distribution of the month-to-month variations. In the winter wheats the largest month-to-month price changes tended to occur between June and July, ex-

cluding the exceptional years; in the case of spring wheat at Minneapolis, the largest change from month to month tended to occur from July to August, and at Winnipeg, from August to September. These changes are usually downward, as one might expect from the recurring seasonal movement discussed below, and are characteristically due to the transition from one crop year to the next, complicated as it is by trading difficulties, the influence of futures, and uncertainties as to the size of the carryover as well as of the crops in process of harvesting. In May also was displayed occasionally a tendency to sharp price variation.

The month-to-month price variations are apt to affect one kind of wheat more than the other. They emphasize again the importance of analyzing, in each crop year, the regional as well as general circumstances attending month-to-month price variations. It is important, in the case of wide month-to-month variations, to determine to what extent these are synchronous with corresponding variations in foreign markets and thus related to international rather than to domestic influences.

The distribution of high and low prices throughout the crop year may also be illustrated over a longer period, with the use of the records of the Chicago Board of Trade. Over the forty-year period ending in 1914, Table 5 (p. 260) gives the number of times each individual month showed the extreme price—the highest or lowest single day's price of the year.

These data illustrate at once the tendency to a recurring relationship, and also the pronounced occurrence of irregularity. May showed the largest number of highest single day's prices, April showed the second largest. Not once in the forty years did March show the highest single day's price of the year; July and November each showed it once. July, August, and October showed the largest number of lowest single day's prices. May showed not once the lowest single day's price of the year; June and September each showed it once. A rather surprising occurrence was the fact that, over the period, high prices were more frequent, and low prices less frequent, in September than in August and October.

The available prices at Winnipeg unfortunately cover only five of the pre-war years. A fairly close parallelism with Minneapolis is to be observed, but the variations in Winnipeg for the post-war period average 30 per cent larger. The median month-to-month change is 5.2. This compares with a median month-to-month change at Minneapolis of 4.0 for the same period and a median of 5.1 for No. 2 Red Winter at St. Louis.

TABLE 5.—INCIDENCE OF EXTREME PRICES OF CONTRACT WHEAT IN CHICAGO, 1875 TO 1914*

Month	Number of times that highest price of year occurred in month indicated	Number of times that lowest price of year occurred in month indicated
January	3	6
February	4	2
March	0	2
April	7	3
May	8	0
June	4	1
July	1	7
August	2	7
September	5	1
October	4	7
November	1	2
December	5	4

* Data from *Seventieth Annual Report of the Trade and Commerce of Chicago* (Chicago, 1928), p. 89.

In the case of the spot prices of imported red wheat at Liverpool, we have figures covering the three seven-year periods, though data for a number of months are missing from the series; for the crop year 1904-05 only three month-to-month changes are available. The month-to-month variations in the Liverpool market before the war were as a whole substantially narrower than in the American markets. The median month-to-month change of good average quality red wheat at Liverpool for the first seven years was only 1.4 cents, as compared with medians of 2.6, 2.2, and 1.9 in the three American markets. The relatively higher variation in American markets was a consequence chiefly of the short United States crop of 1904, in the face of an ample world crop, which placed the United States near a domestic price basis. For the period 1907-14 the median change at Liverpool was 2.3 cents, just equal to the median price change

for No. 2 Hard Winter at Kansas City and below the medians for the two other United States markets. Not once during the 1900-07 period did the month-to-month variation in Liverpool equal or exceed 10 cents and such a variation occurred only once during the 1907-14 period.

Since the war, however, the month-to-month variations at Liverpool have been about as wide as on the two most variable North American markets. For illustration: in July 1924 the price was 17 cents above that of June and rose again 17 cents in August; in March 1925 the price fell 16 cents from February and declined 23 cents more in April; in July 1925 the price declined 6 cents, rose 12 cents in August, declined 8 cents in September, declined another 14 cents in October, then rose 5 cents in November and 18 cents more in December. The median change of good average quality red wheat at Liverpool for this period was 5.1 cents, as compared with 5.2 cents at Winnipeg, 5.1 cents at St. Louis, and 4.0 cents at both Minneapolis and Kansas City.

For convenience the medians of month-to-month price changes for red wheat at Liverpool may be tabulated as follows in cents per bushel, together with other medians not previously shown in Table 4 (p. 257) :

	1900-07	1907-14	1921-28
Good average quality red wheat at Liverpool	1.4	2.3	5.1
British imported wheat...	1.0	1.4	3.2
No. 1 Manitoba Northern wheat at Winnipeg .....	...	...	5.2

Though the month-to-month variations in the declared values of import wheats in the United Kingdom are not comparable with the month-to-month variations on the spot wheat market, on account of lags in the flow of exports and the nature of the reports under the official regulations, nevertheless they present suggestive indications. The medians of month-to-month changes for British import prices, as shown in the tabulation above, run quite uniformly below the median changes for good average quality red wheat at Liverpool, being slightly over 70 per cent of the latter in the first period and slightly over 60 per cent of the latter in the two subsequent periods.

If the price series for red wheat at Liverpool were complete for the first period the median change for that series would undoubtedly be raised, quite possibly enough to show the variability of the import price series to be only about 60 per cent of that for the Liverpool series in this period as in the two later periods.

however, that the concentrating dependence of Great Britain on North America for her wheat supplies tends definitely to increase the variability of British wheat prices. .

The British import prices in a sense correspond to the level of a reservoir, which does not rise or fall as rapidly as the streams that enter it. In a similar sense,

TABLE 6.—NUMBER OF MONTHS SHOWING INDICATED CHANGES ABOVE OR BELOW PRICE OF PREVIOUS MONTH, OF GOOD AVERAGE QUALITY RED WHEAT AT LIVERPOOL, BRITISH IMPORTED WHEAT, AND NO. 1 MANITOBA NORTHERN WHEAT AT WINNIPEG, 1900-07, 1907-14, AND 1921-28*

Change above or below pre- vious month	Good average quality imported red wheat at Liverpool			British imported wheat			No. 1 Manitoba Northern wheat at Winnipeg		
	1900-07	1907-14	1921-28	1900-07	1907-14	1921-28	1900-07	1907-14	1921-28
0	16	11	9	24	15	7	..	..	4
1	26	18	7	32	28	14	..	..	11
2	13	12	7	18	19	15	..	..	8
3	6	17	6	6	8	11	..	..	10
4	2	7	5	2	5	4	..	..	5
5	6	4	8	1	5	6	..	..	5
6	3	4	6	1	1	7	..	..	5
7	1	3	3	..	1	5	..	..	6
8 .....	..	1	1	..	1	2	..	..	3
9 .....	..	3	3	..	1	2	..	..	7
10 .....	..	..	4	..	..	4	..	..	1
11 .....	..	..	2	..	..	1	..	..	2
12 .....	..	..	3	..	..	..	..	..	..
13 .....	..	..	1	..	..	3	..	..	1
14 .....	..	..	1	..	..	..	..	..	1
15 .....	..	..	1	..	..	..	..	..	3
16 .....	..	..	2	..	..	2	..	..	..
17 .....	..	..	4	..	..	..	..	..	..
18 .....	..	..	1	..	..	1	..	..	3
19 .....	..	..	..	..	..	..	..	..	..
20 .....	..	1	..	..	..	..	..	..	1
Over 20 .....	..	..	5	..	..	..	..	..	8
Total	73	81	79	84	84	84	..	..	84

* Based on data in Appendix Tables XI-XIII.

It is noteworthy that both series of British wheat prices show a greater increase in variability in the post-war period over the pre-war period than do the United States series. This relative increase in variability of the British series is in part a consequence of the disturbance in the international exchanges while England was off the gold standard, and in part a consequence of the high and variable freight rates and the interruption of the flow of wheat incident to the British coal strike of 1926. The variability of British wheat prices accordingly may not be expected to remain at such a relatively high level. It may well be,

the American export price would be expected to display less variation from month to month than is to be observed on the terminal markets. For both sets of figures, the weighting serves to smooth the curve of prices. Also, it is obvious that the month-to-month fluctuations in export values of wheat going to Europe from the United States would be expected to be larger than the month-to-month values of all wheat entering Great Britain. The British weighted import values ought to be about the stablest wheat prices in the world and relatively the lowest. A comparison of the declared monthly wheat values with the monthly

spot prices at Liverpool confirms this. Over the year, except under extraordinary circumstances, the month-to-month import wheat price per bushel in Great Britain is significantly stable.¹

No appraisal of month-to-month price fluctuations, strictly construed, is possible unless changes in the wheat price level are taken into account. Fluctuations in price from month to month may be entirely the expression of change in the price level, they may be movements around the unaltered price level, or they may partake of both. Price fluctuations attending change in the price level tend to be relatively extreme. Of the periods here under review, the seven years since the war contain the more pronounced changes in wheat price level. Occasionally, with the use of month-to-month variations a significant change may be obscured. Thus, the price may fall or rise from the middle of one month to the middle of the following month, to be only partially reflected in the monthly prices. Sometimes a price movement may be better judged by weeks than by the month or by the quarter than by the month. This serves merely to enjoin the student of prices not to stick too closely to the use of any set interval of time.

DEVIATIONS FROM ANNUAL AVERAGES

The variability of wheat prices may be judged in terms of deviations from annual averages as well as in terms of the month-to-month changes studied in the previous section. Three distinct types of price variation may be looked for in any price series, and are reflected in measures of variability. Price variations may be quite irregular from month to month, a rise in one month being as often followed by a drop in the next month as by a rise in the next month, and vice versa. In a second type of variation it will be observed that price changes, once initiated, tend to continue through several months; an increase in one month is more likely to be followed by an increase in the next month than by a decrease, per-

haps likely to be followed by an increase in several successive months. In the third type of variation an increase in one month is more likely to be followed by a decrease in the next month than by an increase; there is a distinct tendency to alternation in direction of changes.

The price curves characteristic of the three types of variation may be described as, for the first, entirely irregular, for the second, showing a distinct tendency toward trends running through two or more months, for the third, presenting a saw-tooth appearance.

Three price series showing the same variability when judged by averages of month-to-month changes may show quite different variability when judged by averages of monthly deviations from annual averages, if they represent variabilities of different types. If three series, equally variable when judged by month-to-month changes, show variation of the first, second, and third types, respectively, a calculation of variability in terms of deviations from annual averages will show the second series more variable than the first, and the third series less variable than the first. In the extreme cases the measures in terms of deviations from annual averages may show the second series twice as variable as the first, the third series only half as variable as the first, though in terms of month-to-month changes they appeared equally variable.

We cannot here enter into a detailed study of the type of variation shown by wheat prices. It is apparent from a brief study of the data that the variation of wheat prices is close to that of the first type. Periods will be found in which an upward or downward movement continues through several months, as is generally observed in variations of the second type. Periods will also be found in which the curve presents a saw-tooth appearance characteristic of type 3. But one cannot tell in advance whether a period will show the one or the other type of variation or neither. This is precisely what is to be expected with the irregular variations of type 1. The nature of the wheat market, furthermore, is such as to lead one to expect irregular variations. If it were demonstrated that wheat prices showed a variation other than that of

¹ "Liverpool prices are more closely related to the amount of wheat directly at the disposal of western Europe (west-European production plus imports) than to the world production." V. P. Timoshenko, *Wheat Prices and the World Wheat Market* (Cornell University Agricultural Experiment Station Memoir 118), December 1928, p. 87.

type 1, it would be demonstrated that the wheat market works very badly indeed.

Our present problem is, then, merely to measure variability of prices of different wheats in different markets and in different periods, on the assumption that we have to deal with variations of a quite irregular type, such that the change in one month cannot be predicted from the change in the previous month. We have merely to decide whether the month-to-month changes or the deviations from annual averages provide a more trustworthy basis for judging this type of variation. For this purpose the month-to-month changes are clearly to be preferred. They are much less affected by peculiarities of individual years or groups of years in which prices happen to show marked trends over periods of several months, or in which there happens to occur a series of alternations in month-to-month changes.

CAUSES OF VARIATIONS

The effective causes of wheat price fluctuations (outside of the carrying costs) range themselves rather naturally into several groups. Whatever their nature, such causes attain their effects by determining the withholding, and the buying or selling of cash wheat or wheat futures. It is impossible discriminatingly to appraise the relative effects of a series of coexisting and overlapping influences; therefore, it is always somewhat hazardous to ascribe a particular fluctuation directly to a particular cause. Under certain circumstances, however, the relation between cause and effect is obvious.

The first group of causes that produce wheat price fluctuations express relations of domestic supply and demand for actual wheat. The quantity available for a crop year is a major factor determining the broad level of wheat prices for the year. A change in governmental report of yield, heavy or light marketing from the country, reports of accumulation or shortage in terminals in a region, heavy or light buying by mills, a shift in the visible supply or in the amount of wheat afloat, greater or lesser buying by exporters—these illustrate the factors in relation of supply to demand that tend promptly to influence the price of wheat over periods of days, weeks, and

months. The more comprehensively the various items of supply and demand are covered, the more accurate the report and the more widespread the dissemination of such information, the easier it becomes to forecast the influence of physical supply and effective requirements as factors on price.

Statistical data, however, are more or less incomplete, out of date, and relatively untrustworthy. The well-informed judgments of experienced traders form a body of opinion that is likely to find a more or less concordant expression in the buying or selling of wheat futures, and in transactions in cash wheat. Such opinions sometimes rest on advance information of physical factors. Trade opinion may support crop reports or controvert them. Grain houses maintain private statistical services whose activities lie as much in the dissection of intelligent opinion as in compilation of data. Occasionally the grain exchanges are invaded by nothing less than an army of amateur speculators, usually bulls, whose transient and emotional opinions for the time being overwhelm the opinions of professional speculators and merchants.

There is next the corresponding body of information on supply and demand in the world. This information tends to lag and is in part less accurate, but none the less important in bearing on domestic price variations.

An important group of factors involving fluctuations in wheat prices includes new developments in the wheat crops, or other crops, and also to some extent new developments of a political and economic character that indirectly promote price changes. In every month of the year, somewhere in the world among the importing or exporting countries which trade on the international wheat market, wheat is being planted, is holding its own in condition or losing or gaining, and is being harvested.¹ The influence of weather reports on price is in the main, at least early in each situation, the result of opinion rather than of record. Weather changes provoke scares of crop failure in a sense in which they do not provoke scares of bumper crops. Just as the

¹ There is, however, a midwinter period in which relatively few changes occur.

developments in the different wheat regions of the United States affect domestic wheat prices, and through them international wheat prices, so the successive developments in other countries affect their domestic wheat prices, through them the international wheat prices and through them our domestic wheat prices. These developments may come to light through the media of trade information or through official channels. In international trade, expert opinion is often, perhaps usually, in advance of official reports. In some countries, like Argentina, there is little else than professional opinion available. The more comprehensively such information on crop developments comes in from the world at large, the more accurate the information and the more widely disseminated, the easier it is for expert trade opinion to judge of the influence on prices of wheat in this country. Crop developments at home and abroad provoke short-term fluctuations, influence the month-to-month variations, and exaggerate or diminish the seasonal movement. They tend to produce shifts in price level of wheat, and in consequence modify the price relations attending transition from one crop year to another.

Various influences outside of the domain of wheat may influence wheat prices. The

course of prices of other grains is one of them. Numerous incidental and accidental factors may provoke short-term fluctuations. Changes in money rates, foreign exchanges, shipping charges, prospects for legislation, and elections at home or abroad are illustrations. Such external factors may exert pronounced influence, but more often the import is exaggerated. Whenever an obvious influence is not visible, imagination in the trade conjures up factors.

Lastly, we come to speculation. Trading in contracts for future delivery is a practice based on price variation. Broadly considered, the effect of speculation is to distribute risks and carrying charges, which tends to stabilization of price. But locally considered, speculation depends on price fluctuation, since speculators enter the market to buy at one level and sell at another.¹ The influence on wheat prices of speculation in wheat futures is a subject on which we do not plan to enter here. Proponents and opponents of speculation in wheat futures agree that it influences prices; they disagree as to whether such influence is of benefit or of injury to wheat growers. There is considerable to be said for the view that speculation often merely accelerates price changes already under way in consequence of determinable influences.

V. THE RECURRING SEASONAL PRICE MOVEMENT

Among the intra-seasonal price variations is one type, often obscured by others and yet underlying them, which may be termed the recurring seasonal price variation. We refer to the tendency of wheat prices, following the harvest, to rise by gradual increments to a high point before the succeeding harvest. Such a recurring seasonal movement of a fairly characteristic form is of course not peculiar to wheat; it is observed with other grains and also with many other commodities which are produced within a restricted season but marketed and consumed throughout the year—and indeed with certain others as well. Such a tendency occurs in every wheat-growing country of importance; but the onset and culmination vary in the different countries according to differences in harvest periods and other factors. Whether

or not it occurs on the international market is quite another matter.

CARRYING CHARGES

The fundamental basis of this tendency lies in the cost of holding or "carrying" wheat. Harvested in each country within a few weeks or months, wheat is milled or exported throughout the year, and is finally consumed quite evenly throughout the year. Portions of the crop must, therefore, be carried for shorter or longer periods by growers, middlemen, or millers. On some wheat rest only two or three months' carrying charges, on other wheat rest the carry-

¹ As a part of speculation must be assigned the price influences of current grain storage conditions in terminal markets. Cf. B. F. Goldstein, *Marketing: A Farmer's Problem* (New York, Macmillan, 1928), pp. 231 ff.

ing charges of eight or nine months, or the full crop year. Wheat is a durable good, but it requires appropriate storage if it is not to deteriorate; commonly, storage involves one or more additional handlings; the wheat must be insured; it represents an investment involving a cost for interest. There is no commercial motive in holding wheat in quantities beyond those required for current operations of millers and merchants, except occasionally for high-quality wheat, unless the price broadly tends to rise each month by an increment sufficient to cover the effective carrying expenses.

When the wheat grower has completed his harvest, as a rule he needs ready money, he does not wish to bear the carrying expenses, he prefers to avoid extra handlings and risks of injury to his grain, he does not wish to continue investment in a harvested but unmarketed crop, and he desires to avoid the ever-possible risk of a low price later as a result of abundant harvests elsewhere. In practice, the burden of carrying wheat is shared, in proportions that vary from year to year, by wheat growers, grain dealers, and flour millers. Dealers and millers regularly hedge all wheat held, and in effect the burden of carrying wheat is thus shared by speculators in wheat futures.

The gross carrying expenses fall into two groups—those relating to the physical plant of storage and those connected with the grain itself. In the elevators and warehouses and their contained equipment lies an investment; these are usually leased to the elevator men by their owners and to the appropriate return on the investment must be added insurance and provision for depreciation and upkeep. The wheat must be elevated (possibly several times), and conditioned (possibly several times), and there must be provision for interest and insurance on the wheat. These several items, related to the physical plant and to the wheat, vary somewhat from region to region and from time to time. Interest on the money in the wheat varies with the rate on commercial paper. Insurance rates vary with the construction of the elevator and the value of the wheat. Elevator charges, including unloading in and loading out with ten days' storage, are now $1\frac{1}{4}$ cents per

bushel at Chicago and $\frac{1}{20}$ of one cent per bushel per day thereafter. Thus, the first month's carrying charge in Chicago averages around 3 cents a bushel on \$1.20 wheat, and thereafter $2\frac{1}{4}$ cents a bushel. The charges in other terminals are commonly lower than in Chicago.

The recurring seasonal price variation corresponds to the monthly increment necessitated by the cost of carrying the wheat. If the copper supply of a year were mined in a month, other things being equal, the price of copper in each month following the mining month would rise by an amount corresponding to the handling charges and interest on the money invested in the metal. Similarly, other things being equal, the price of wheat in any region ought to rise each month by an increment representing the carrying charges of the month. These carrying charges are not represented by a constant rate, but may be thus treated as a straight line, as was done by the Federal Trade Commission, without serious misconstruction.

What we term the recurring seasonal price variation is, in the case of wheat (unlike eggs, for example), far from being a dominant or even a prominent factor in the crop-year price movement. The latter includes the recurring seasonal price variation, but also the results of the influence of other more or less predominating factors. These are, notably, the size of the harvest, the course of shipments from country and receipts at terminals, position of visible supplies, the milling demand, the prices of other grains, the rate of export, and the behavior of futures. Whenever the wheat price level shifts greatly from one crop year to the next, the transition is attended with additional variations in the crop-year price movement. These various factors tend to elevate or depress prices; their effects are added to the recurring seasonal price variation in some years and subtracted from it in others. The recurring price variation is a fairly constant variable; the other named factors are quite inconstant both as to occurrence and extent. In many crop years, the wheat price toward the close of the season stands above that near its beginning by the amount of the carrying charge, or within a few cents of it,

above or below. In exceptional years, on the other hand, the price in May will exceed the price in the preceding August by several times the carrying charge; or the price in May may be substantially below the price in August without any apparent reference to the carrying charge.

These considerations suggest the reasons why it is difficult statistically to isolate from actual price data the recurring seasonal element. The usual methods of deriving indexes of seasonal variation make use of devices for canceling out other factors than those of a recurring seasonal character. In the case of wheat prices the relatively large influence of factors other than the seasonal renders the results of this procedure of questionable value; and there is the further difficulty that, as with many other commodities, there may be significant changes in the seasonal factors over periods of years sufficiently long to yield an approach to effective cancellation of other factors.

STUDY BY FEDERAL TRADE COMMISSION

The Federal Trade Commission in its Report on The Grain Trade gave attention to the seasonal movements of grain prices, which it termed "the annual price cycle." The views of the Commission may be found expressed in the following quotations:

The annual price cycle.—It appears that there is a well-defined annual cycle in the curve of cash-grain prices, characterized by a comparatively low price immediately after the harvest, a gradual increase in price to a comparatively high point some time in the spring, and then a rather rapid falling off in price to a comparatively low level for the new crop. Unfortunately the grain is in the hands of the producer immediately after the harvest, when prices are generally lowest, and the producer has parted with it at the time when prices are highest, so that the gain from the increase in prices is likely to go chiefly to grain merchants or to speculators.

It is, of course, true in many individual years that there is not an advance in prices from the fall to the spring, and oftener still that there is an absence of a sharp falling off in price between the last month of the old crop year and the first months of the new crop year. It may be that the new crop is smaller than the previous crop, and, therefore, that prices remain high or even increase at the time of the year when there is ordinarily a decrease in prices.¹

It will be observed that the lowest average price for wheat at Chicago occurs in August and

the highest in May. The steps between these extremes are not absolutely regular, there being small recessions in November and March, but the general seasonal variation of prices is quite definite and its character unmistakable.²

CONCLUSIONS.—A definite seasonal cycle appears in the fluctuation of the monthly average prices for each of the five grains. It is perhaps better defined for rye, corn, and oats than for wheat. It is least well defined for barley. The degree of lack of regularity for wheat is due largely to the separation of winter and spring crops tending to cause a double cycle. It may also be affected by Southern Hemisphere shipments. Wheat is an article of world production and commerce to a greater extent than other grains, with almost uninterrupted increments of supply, though irregular in size and in time of harvest, accruing throughout the year.

The annual cycle corresponds rather closely to the crop years of the various cereals in the Northern Hemisphere, but there is a marked lag of prices in their response to the harvest. The lowest price is reached not immediately after harvest, but after more or less of an interval, during which the flow of grain to the terminal market is at its height. The highest price is reached some time before the next crop is gathered, commonly in May, but sometimes in the very last month of the crop year. The decline of the price may be accelerated or counteracted by what is known of the condition of the approaching crop. The situation at the close of the year is also affected by the preference of millers for old-crop wheat.³

The Commission undertook to measure the seasonal variation, using the spot prices reported by the Chicago Board of Trade for contract grade wheat, choosing whichever was cheapest of northern spring, red winter, and hard winter wheat. The daily prices were averages of the high and low quotations; the monthly averages were means of the daily prices; the annual prices were means of the twelve monthly prices. In order to obtain an approximation to the seasonal variation, average prices for successive January's, February's, etc., were prepared for the thirty-year period, 1886-1916, and also for three ten-year periods, presumably on the assumption that non-seasonal influences would cancel out and leave the seasonal movement revealed.

The tabular material of the Commission, rearranged into one table, is contained in

¹ Federal Trade Commission, *Prices of Grain and Grain Futures* (Report . . . on the Grain Trade, Vol. 6), 1924, p. 6.

² *Op. cit.*, pp. 66-67.

³ *Op. cit.*, p. 73.

Table 7. Striking is the difference between the seasonal variation, from August to May, in the three ten-year periods. The Commission remarked that these differences were misleading. During the first ten-year

TABLE 7.—AVERAGE MONTHLY PRICES OF CASH WHEAT AT CHICAGO*
(Cents per bushel)

Month	30-year average 1886-87 to 1915-16	Averages by 10-year periods		
		1886-87 to 1895-96	1896-97 to 1905-06	1906-07 to 1915-16
July	82.69	75.06	77.08	95.93
August	82.44	76.08	77.15	94.07
September	84.21	76.85	79.27	96.53
October	84.83	77.68	79.82	96.99
November	84.60	76.94	80.66	96.19
December	85.67	76.05	81.63	99.34
January	86.84	75.25	82.02	103.26
February	88.35	75.77	83.54	105.75
March	87.23	75.85	81.87	103.97
April	88.73	77.45	82.07	106.67
May	92.11	79.19	86.50	110.64
June	86.83	76.11	81.68	102.71
Spread between August and May prices...	9.67	3.11	9.35	16.57

* Data from Federal Trade Commission, *Prices of Grain and Grain Futures* (Report . . . on the Grain Trade, Vol. 6), 1924, pp. 66, 68.

period the price level of wheat was declining, while during the second period it was rising, which would explain in part the differences in seasonal variations. The high figure for the last ten-year period was attributed largely to the rapid rise of wheat prices during the last two years of the period.¹

The Commission prepared a table of computed carrying costs (storage, interest, and insurance) for wheat at Chicago from

¹ In the price series used by the Federal Trade Commission were included four squeezes on the Chicago market—during 1887-88, 1897-98, 1904-05, and 1908-09—which disturbed the seasonal variation from fall to spring. These Chicago squeezes in 1904-05 and 1908-09 had little influence on the weighted prices in Minneapolis, St. Louis, and Kansas City, used later in our tabular illustration of seasonal price variation.

² *Op. cit.*, Table 68, p. 195. The estimates were maximal rather than actual.

³ Author's note: In the trade other factors are included, such as course of country marketing, mill demand, prices of other grains, rate of export, and behavior of futures.

⁴ *Op. cit.*, p. 74.

1886 to 1920.² These published carrying expenses were larger than the average increase in wheat price from August to May. For the first decade, when the seasonal change was only 3.11 cents per bushel for the nine months, the computed average carrying charge was around 14 cents. For the second ten-year period, when the seasonal change from August to May was 9.35 cents, the average carrying charge was around 12 cents. For the last ten-year period, when the average seasonal change from August to May was 16.57 cents (clearly abnormal because including two war years), the average carrying charge was around 14 cents. Only in a few years did the spread between August and May equal the computed carrying expense for that year, and these were mostly in the decade 1907-16. It followed that, except in the last period, the formal and published carrying charges exceeded the seasonal variation, for which an explanation had to be sought in other factors, some of which were considered by the Commission.

What the Federal Trade Commission called the "annual price cycle" was substantially what we have termed the recurring seasonal price variation, but the Commission's discussion made reference also to the crop-year price movement, as we have termed it. To quote another passage:

The seasonal cycle of grain prices is determined chiefly by the course of market receipts, by the accumulation of visible supplies, and by the cost of carrying the grain through the winter from the time of large receipts to the period of comparative scarcity near the end of the crop year.³ Decennial average seasonal curves show a rather marked regularity, but when individual years are studied this regularity frequently vanishes. Prices may show either a larger increase toward the close of the crop year than is justified, followed by a sharp readjustment at the close, or a decline through most of the year. So many different factors influence the price level at any time that it becomes difficult, if not impossible, to isolate one particular factor and determine its effect.⁴

The Commission also considered several factors that influence the crop-year price movement outside of the recurring seasonal price variation: the carryover, increasing and decreasing crops, transition from one crop year to another, increasing and decreasing wheat price levels, farm market-

ing, terminal receipts, and the visible supply in their relations to the annual cycle of wheat prices; it did not, however, establish clear-cut correlations of significance.

Now it is one thing to ascertain and assign the causes for all the variations in wheat prices that occur within a crop year; it is another to isolate the variations that may properly be regarded as due to seasonal influences proper (as distinguished from erratic and inter-seasonal influences); and it is still another to measure the characteristic or typical, or the average, recurring seasonal variation. The Commission's calculations represent a rough measure of the average seasonal variation; its discussions, however, pertained more largely to the causes of intra-seasonal and other fluctuations of various sorts.

Partly to supplement the studies made by the Federal Trade Commission and partly because we believe the wheat prices made available by the Department of Agriculture subsequent to the investigations of the Commission are superior to those used by the Commission, we have undertaken a tentative incursion into the subject.

ANOTHER ROUGH ANALYSIS

In order to form an estimate of the occurrence and extent of the expected movement of cash wheat price from fall to spring, we employ the material in Table 8, derived from data in Appendix Tables II-V. Since it might be misleading to contrast the lowest price in the summer or autumn with the highest price in the spring (because these might be exceptional), and since the quotations ought hardly to be confined to months in which futures are closed out, it will serve to use the averages of two months.¹ In the case of the winter wheats, the average price of hard winter wheat during July-August in Kansas City is contrasted with the average of the subsequent May-June price on the same market; for soft red winter wheat, a corresponding comparison is made of prices on the St. Louis market. In the case of hard spring wheat, the September-October price at Minneapolis is contrasted with the subse-

quent May-June price. In the case of Winnipeg, the contrast would be between the averages of October-November and the subsequent May-June.

With the hard winter wheats, the period of waiting would be two months longer than with American hard spring wheat. This, however, is necessary since cash prices on spring wheat cannot be quoted until the new crop is in, and it is advisable, on account of the peculiarities of the July future, to have the spring quotations terminate with June. Other things being equal, therefore, one would expect a narrower price change with American spring wheat than with the winter wheats, because the term is shorter.

In the fourteen crop years before the war, the May-June price of hard winter wheat at Kansas City was higher than the July-August price in ten years, but in four years it was lower. In the case of soft red winter wheat at St. Louis, the same was true, but in two years the directions of deviation were different. In the case of hard spring wheat at Minneapolis, the May-June price was higher in nine years, lower in four, and unchanged in one. In only one year, 1910-11, was the spring price of wheat lower than the post-harvest price in all three markets. The outcome in the three markets, thus considered, exhibited some irregularity.

The following averages of the price changes in seven-year periods shown in Table 9 must be regarded with circumspection, especially because of the inclusion of several highly exceptional years. For example, in 1908-09, due largely to international circumstances, the spring price of wheat was extraordinarily elevated; this had a pronounced effect upon the averages, since in that period there was no corresponding occurrence of an extraordinary price decline from fall to spring. Taking the averages for what they may be worth, the mean change from July-August to May-June at Kansas City was 8.3 cents during 1900-07, and 8.9 during 1907-14. At St. Louis, the mean change was 10.7 cents per bushel during 1900-07, and 11.4 during 1907-14. The mean change from September-October to May-June at Minneapolis was 6.7 cents per bushel during 1900-07 and

¹ The averages of three post-harvest and three pre-harvest months would give about the same result.

5.3 cents during 1907-14. The occurrence of minus as well as plus deviations, the wide dispersion, and the general appearances of irregularity indicate that while a

ber-November to May-June was 4.6 for the five-year period, 1909-14.

With respect to the seven post-war years, 1921-28, the changes conformed more

TABLE 8.—NET CHANGE BETWEEN AVERAGE CASH SALES PRICES OF VARIOUS WHEATS AT BEGINNING AND END OF CROP YEAR, 1900-14 AND 1921-28*

(Cents per bushel)

Crop year July-June	No. 2 Hard Winter at Kansas City			No. 2 Red Winter at St. Louis			No. 1 Northern Spring at Minneapolis			No. 1 Manitoba Northern at Winnipeg		
	Average of July- August prices	Average of May- June prices	Net change	Average of July- August prices	Average of May- June prices	Net change	Average of Sept.- October prices	Average of May- June prices	Net change	Average of Oct.- November prices	Average of May- June prices	Net change
1900-01..	67.5	68.5	+ 1.0	74.0	72.0	- 2.0	76.0	71.0	- 5.0	....	....	.....
1901-02..	65.0	72.0	+ 7.0	68.5	79.5	+11.0	65.0	75.0	+10.0	....	....	.....
1902-03..	68.0	71.0	+ 3.0	68.5	77.0	+ 8.5	68.5	81.0	+12.5	....	....	.....
1903-04..	71.5	90.5	+19.0	80.5	107.0	+27.0	83.5	94.0	+10.5	....	....	.....
1904-05..	90.5	100.5	+10.0	99.0	106.5	+ 7.5	116.0	111.5	- 4.5	....	....	.....
1905-06..	82.0	79.0	- 3.0	87.0	91.0	+ 4.0	83.5	83.5	0.0	....	....	.....
1906-07..	69.5	90.5	+21.0	72.5	91.5	+19.0	75.0	98.5	+23.5	....	....	.....
1907-08..	86.5	98.5	+12.0	88.0	99.0	+11.0	110.0	108.5	- 1.5	....	....	.....
1908-09..	96.0	137.5	+41.5	93.5	148.0	+54.5	103.5	132.5	+29.0	....	....	.....
1909-10..	108.0	107.5	- 0.5	112.5	109.0	- 3.5	104.0	109.5	+ 5.5	97.0	95.5	- 1.5
1910-11..	102.0	89.0	-13.0	104.5	91.0	-13.5	108.5	98.0	-10.5	95.0	96.0	+ 1.0
1911-12..	90.0	110.0	+20.0	86.0	116.0	+30.0	109.5	114.5	+ 5.0	99.5	105.0	+ 5.5
1912-13..	90.5	87.5	- 3.0	103.5	101.5	- 2.0	89.5	91.5	+ 2.0	88.0	94.5	+ 6.5
1913-14..	82.5	87.5	+ 5.0	86.5	90.0	+ 3.5	85.5	93.0	+ 7.5	82.0	93.5	+11.5
1921-22..	116.5	125.5	+ 9.0	123.0	128.0	+ 5.0	142.5	155.0	+12.5	103.0	137.5	+34.5
1922-23..	108.5	110.0	+ 1.5	110.5	128.0	+17.5	112.5	122.5	+10.0	105.5	113.5	+ 8.0
1923-24..	98.5	107.0	+ 8.5	98.0	114.0	+16.0	120.5	123.5	+ 3.0	96.0	107.5	+11.5
1924-25..	119.5	161.5	+42.0	136.5	187.5	+51.0	138.0	165.5	+27.5	162.0	176.5	+14.5
1925-26..	159.0	154.0	- 5.0	165.5	154.5	-11.0	149.5	162.5	+13.0	134.5	153.5	+19.0
1926-27..	134.0	143.0	+ 9.0	138.0	146.0	+ 8.0	146.0	148.0	+ 2.0	142.0	158.0	+16.0
1927-28..	135.5	153.5	+18.0	141.5	187.5	+46.0	131.5	152.5	+21.0	144.5	150.0	+ 5.5

* Based on data in Appendix Tables II-V.

seasonal movement was in evidence, as suggested in the averages, other influences

TABLE 9.—AVERAGE CHANGES BETWEEN CASH SALES PRICES OF VARIOUS WHEATS AT BEGINNING AND END OF CROP YEAR, BY PERIODS*
(Cents per bushel)

Period	No. 2 Hard Winter at Kansas City	No. 2 Red Winter at St. Louis	No. 1 North- ern Spring at Minne- apolis	No. 1 Mani- toba Northern at Winnipeg
1900-07.....	8.3	10.7	6.7	....
1907-14.....	8.9	11.4	5.3	4.6 ^a
1921-28.....	11.9	18.9	12.7	15.6

* Based on data in Table 8.

^a Average of years 1909-10 to 1913-14.

were frequently at work to exaggerate or minimize the strictly seasonal influence. At Winnipeg, the average change from Octo-

closely to the doctrinal expectations, since there was only one minus year in the seven, and that only at Kansas City and St. Louis, not at Minneapolis or Winnipeg. On the other hand, in two years the increases in wheat prices from fall to spring were extraordinarily large, due to the shift from a lower to a higher price level in 1924-25 and to a crop scare in 1927-28. Taking the averages for what they may be worth, over the seven years 1921-28 the average change at Kansas City from July-August to May-June was 11.9 cents, at St. Louis, 18.9 cents. The change from September-October to May-June at Minneapolis was 12.7 cents; the change from October-November to May-June at Winnipeg was 15.6 cents. The increases in the post-war years have been more in conformity with the theory of the

carrying charges than was the case in the fourteen years before the war.

Even more significant is the observation that in the pre-war period of fourteen years there were only six years in each market in which the advance in price approached or exceeded what may reasonably be considered a low estimate of the inclusive carrying charges. In four years there was a decline or no net advance; in the other four, the net advance was appreciably below the cost of carrying wheat from soon after harvest until the late spring. In the post-war period of seven years there were only two in which the net advance in price clearly equaled or exceeded the full gross carrying charges.

Let us next consider the situation according to a formulation most favorable to the merchant carrying wheat. Let us assume that in each of the seven years in the three periods, the wheat was purchased in the cheapest month of the three months following the harvest (July, August, and September for winter wheat, and September, October, and November for spring wheat), and sold in the dearest month of the three months at the end of the crop year (April, May, and June). Using the figures in Appendix Tables II-IV, it is assumed that the merchant purchased a cross-section of the wheats of the grade in each market. For each year the price change is noted and the number of months involved. These are then combined and averages secured.

The resulting figures, summarized below in cents per bushel, represent, in monthly averages, the increased price in cents per bushel (representing the seasonal movement of the wheat price), that would have accrued to the wheat merchant in each period had he purchased a cross-section of wheat of the stated grade, during the lowest price month of the three months following the harvest and sold it in the highest price month of the three months prior to the next harvest:

	1900-07	1907-14	1921-28
Hard spring wheat	1.5	1.4	3.1
Hard winter wheat	1.3	1.4	2.2
Soft red winter wheat	1.5	2.0	3.1

This, of course, gives an exaggerated figure for the seasonal change, since no one

buys at the bottom and sells at the top. Yet even with this exaggerated change, it is clear that the full published carrying charges would hardly have been covered in any period in any market before the war. The 3.1 cents per month given as spreads for the period 1921-28 for hard spring and soft red winter wheats, would have covered the carrying expenses remuneratively; but the others would have been barely sufficient or insufficient.¹

INFLUENCES OBSCURING RECURRING SEASONAL MOVEMENTS

The recurring seasonal price advance does not begin at the same time or from the same relative position, year after year, even when the wheat price level remains the same. There is always more or less difficulty attending the transfer from the closing prices of the old crop to the early prices of the new crop. The old wheat has borne the carrying charge and its milling qualities are known; the new wheat has borne no carrying charge and the milling qualities are not yet established. With pressure of farm shipments and terminal receipts, new-crop prices tend to sag; the sagging is more or less deep and more or less prolonged in different years. The carryover, as well as the new crop, influences the course of prices

¹ An interesting side-light on the question is afforded by Liverpool wheat prices, as shown by Broomhall's series, assembled by the Department of Agriculture, for good average quality imported red wheat at Liverpool. Taking forty years before the war, 1875-1914, the May price was higher than the preceding November price in 19 years and lower in 20 years. (The price for November 1904 is not available.) The differences were usually not pronounced, but sometimes the spreads were very wide. Thus, in five of the years the May price was more than 15 cents higher than the November price and in three of the years the May price was more than 15 cents lower than the November price. Liverpool was of course in position to reflect the low post-harvest price of every exporting country. Over the period, a change occurred; in the first twenty years, the May price was higher than the November price seven times and lower thirteen times; but in the last twenty years, the May price was higher than the November price twelve times and lower seven times. A secular trend, downward in the first half, and upward in the second, was at least in part responsible for this turn of price developments. Whenever in any year during this period, American export wheat appeared on the market in Liverpool both in November and May, if the May price in Liverpool were lower than the November price, this tended to keep down the American May price, relative to the price in November.

directly after harvest. Ordinarily, during the late winter and early spring months, the July future is at a discount under the May future. The smaller the visible supply and the prospective carryover of old wheat, the more the July future tends to be under the May future; the larger the visible supply and the prospective carryover of old-crop wheat, the more the July future tends to a premium over the May future. Often, also, there is difficulty in transition from the July future to the September future. The hedges of millers and terminal elevators against cash purchases of country wheat are by many believed to intensify the sag of wheat prices directly after the harvest. Wheat growers are convinced that short selling by speculators has this effect. However deep or prolonged the post-harvest depression of prices (which in exceptional years may be absent), sooner or later the recurring price advance appears and, other things equal, continues over the winter.

In order equitably to appraise the price movement from fall to spring, it is necessary to study the price-influencing factors in each year. The early post-harvest price of winter wheat in the American market may be influenced by developments in the Southern Hemisphere; the spring price of wheat may be particularly influenced by developments in both the Southern and the Northern Hemispheres. If, in the summer, for illustration, the forecast for wheat in the Southern Hemisphere is reduced, the tendency to price decline in the American market would be restrained, or indeed, the price might rise; conversely, if a bumper crop in the Southern Hemisphere should be forecast, the wheat price would be depressed in the American market. Similarly, an early forecast of a small or large crop in Canada would influence wheat prices in the summer or autumn upward or downward in the United States. If influences appear in the spring indicating a larger crop and a lower price for the next crop year, the May-June price may recede and stand relatively or absolutely below the price of the previous autumn; or if influences are evident suggesting a short crop and a high price for the following crop year, the May-June price on the American market would

soar in anticipation. If, as, and when the price of wheat directly after the harvest is depressed below what it would seem it ought to be on the basis of supply and demand, then the recurring seasonal rise starts from too low a level, and the recovery from the temporary marketing price depression would tend to add to the seasonal change.

The summer and fall prices of wheat may be raised or lowered by factors outside of the domestic situation during the same crop year; and in the spring the price may be modified by domestic and foreign influences appertaining to the following crop year. Put in another way, the otherwise seasonal price movement may be exaggerated or minimized by various intra-seasonal influences; and, perhaps more important still, the seasonal price movement may be exaggerated or minimized by inter-seasonal influences. The wheat price of a crop year is to some extent the expression of conditions in the previous crop year and in the forthcoming crop year, and not alone in the crop year under consideration; variations between these three sets of influences find diverging expression in changes which are superimposed upon the so-called seasonal price movement from fall to spring.

HOW WHEAT IS COMMONLY CARRIED BY THE TRADE

It seems clear from the several tables that if wheat were dealt in as a cash commodity, the margin between the price after the harvest and at the close of the crop year would not usually be sufficient, judging from the past, to cover the gross costs of carrying wheat.¹ This inference is fully accepted in the trade. Banks hesitate or decline to loan on unhedged wheat and grain merchants practically never carry wheat unhedged. Yet the wheat is carried season after season. For this the explanation is to be sought, at least in part, in exchange trading whereby, through the practice of hedging, a part of the risk is taken from the grain merchant and distributed over a body of speculators.

¹ In the absence of futures trading, the price change from fall to spring would be much larger, as is illustrated in domestic wheat prices in many European countries.

NOTE

In the United States the carrying of grain was early developed and organized on the basis of trading in wheat futures on established grain exchanges. In effect, the function of carrying wheat was taken over in part by speculators, through whose operations the grain merchants and millers were placed in position to secure insurance against risks by hedging their commodity operations. The same development occurred in Canada when she became an important wheat-exporting country. The North American development of the grain trade was associated with bulk handling and the transportation facilities adapted to it.

In Russia,¹ India, Argentina, and Australia (and in our Pacific States), on the contrary, the carrying of grain in the domestic markets was not, before the war, based on exchange trading. These countries had, for the most part, bag handling instead of bulk handling, with corresponding equipment of elevators, warehouses, and transportation facilities. The growers rarely held the grain throughout the season; usually the millers and grain merchants purchased the grain and took their chances with price developments. Exporting merchants, to some extent, practiced hedging in Liverpool or Chicago; but for the most part, the grain trade and grain exporters in the countries mentioned were engaged in cash wheat speculation, and were not protected by hedging. This situation still exists in Russia and to a large extent in India; but Argentina has gone over to exchange trading, though not yet fully developed, and Australia will presumably follow. Also, Argentina and Australia are going slowly over to bulk handling of wheat.

Whether wheat can be bought for cash after the harvest, stored through the winter, and sold for cash in the spring at a net merchandising profit, is one question. Whether wheat can be bought for cash after the harvest, hedged by a sale of futures in a selected month in the spring, sold

at chosen intervals and the hedge bought in, at a net profit, is a different question. The one involves a straight comparison between increase in cash price and inclusive carrying charges. The other involves the question of the relation to carrying charges that holds after the harvest between the price of cash wheat and the price of futures in the months in which a hedge will be placed. The pertinent question for the grain trader is: With the cash price of wheat as it stands after the harvest, what prices of wheat futures in the different trading months would need to be secured in order effectively to hedge the transaction and insure a profit to the merchant as handler of the commodity? In theory, the price of the appropriate future must be so far above the cash price of the wheat as to cover the unavoidable carrying charges from the date of purchase to the month in which the transaction is hedged. But this simple situation does not usually obtain, despite the fact that current cash quotations are generally based on the price of the futures.

To a determining extent, the grain merchant is not passive, he does not accept the spread between cash and futures which he finds at the beginning; to a large extent, in a sense, he himself makes the spread throughout the year. He has two sets of variables in his operations: the cash wheat and the wheat futures in his hedges. He buys cash wheat as of the grade or on sample. He is a judge of wheat value, premium milling qualities, dockage, cost of cleaning, and the exact situation of each parcel in relation to specifications of the grade. He understands the influence of volume of operations on expenses. At the time of purchase of the wheat, each transaction is hedged in what appears to be the most favorable month and the most advantageous market. The hedge may be placed in the nearest trading month or in a distant one.

Terminal elevators are classed as private and public, space being available for engagement in the latter. Apart from elevators owned by municipalities and railways at ports of export, however, the so-called public terminal elevators are usually run by elevator operators² or grain companies.

¹ M. J. Bonn, writing in a totally different connection, has given a terse description of the procedure by which, under the Czarist régime of Russia before the war, the harvest-time price of wheat was brought down to the export basis. "The export of grain from Russia before the war was not the result of a Russian surplus of grain; it was brought about because taxes were collected from the Russian peasants at the time of the harvest. The peasant did not merely sell the grain that he could spare; instead he sold the amounts needed to make his payments. He did not sell what he could spare, but he got along without what he had to sell. The simultaneous sales depressed the price of grain to the plane at which export became profitable." [Our translation.] (*Befreiungspolitik oder Beileihungspolitik?* S. Fischer Verlag, Berlin, 1928, p. 59.)

² Cf. B. F. Goldstein, *Marketing: A Farmer's Problem* (New York, Macmillan, 1928), pp. 217-81.

Such elevators, registered and run as public elevators, are a trading protection to the operators, who need to have public space to deposit contract grain for delivery against hedges in case of a squeeze, or to make delivery whenever the current future is not at a sufficient discount under the later future to make it profitable to transfer the hedges. There is now practically no such thing as a speculator or a grain buyer engaging space in a public warehouse run as an independent enterprise. In effect, the public elevators are run for their own transactions by the operators of the private elevators. This makes it all the more important for these operators to keep their elevator space filled. Not only do costs fall as volume rises, the elevator man must have wheat on hand for merchandising purposes. To get grain into store, the elevator operator is usually prepared to face a cut in the stated rate of storage. In fact, wheat is often bought and put into store when the premium of the future over the cash only covers interest and insurance. Purely as a storage proposition, there is no money in running terminal elevators;¹ purely as a margin proposition, the increase in wheat price following the harvest does not cover the storage charges. Placing wheat in store constitutes merchandising opportunities for the wheat trader.

Conducting himself as a merchant engaged in commodity operations, the grain dealer proceeds to dispose of his wheat to the maximum commodity advantage. Some parcels will be binned separately and sold on sample to millers as premium wheats. Other parcels will be blended to meet mill specifications. For the rest, the wheats will be so cleaned and mixed as to raise the weighted grade. Stores of both off-grade and high-grade will be accumulated. A small amount of wheat ranking well above No. 2 specifications, on mixing with a large amount of wheat ranking below No. 2 specifications, will on occasions suffice to bring the entire lot up to the grade of No. 2. For the better-class domestic milling trade, the objective may be to grade up; for a lower milling trade and for the export trade, the

objective may be to grade down. In general, the aim of mixing is to make the contract grade. An elevator company handling several million bushels of wheat, may increase the weighted grade of the entire lot to the extent of several cents per bushel. This is entirely legitimate, was contemplated in the federal grade act, and lies implicit in any set of wheat standards.

The unmixed and various mixed wheats will finally be merchandised on the basis of specifications and quality. In selling his wheats, the merchant will take advantage of short-term fluctuations in the cash markets and in the premiums of cash and futures; each bulge will add a little to his price, and he will hold back his sales during the brief declines. In short, from the standpoint of the intrinsic quality of his purchased wheats and in connection with price fluctuations in the cash wheat market, the merchant will persistently and effectively work to force the weighted sales prices, relative to the futures in which he has hedged, higher than the weighted purchase prices, and at the same time keep the gross expense charge to the lowest possible level.

At the same time, the merchant will usually find himself able to improve his hedging position. The prices of futures in the different markets and in the different months are continuously fluctuating, and by no means synchronously. By appropriate purchase and sale of futures the selling hedge will be closed out in one month or market and reopened in another month or market, whenever the net result is in the direction of increasing the margin between the original cash price paid for the wheat and the contract price of the latest hedge. By transferring the hedges so as to take advantage of developments in the futures market, the grain merchant is not infrequently in position to improve the relations between cash and futures in his transaction by as much as 10 or 15 cents per bushel between the time when the cash wheat was purchased after the harvest and closed out in the following May. When a parcel of wheat is sold, the hedge is usually closed out immediately.

The net effect of these bilateral operations is to increase the margin between

¹ Cf. Federal Trade Commission, *Terminal Grain Marketing* (Report . . . on the Grain Trade, Vol. 3), 1922, p. 147.

weighted purchase price and weighted sales price to such an extent as to equal or exceed the cost of operating his elevator, and thus make the business routinely remunerative. Thus construed, the success of the enterprise of terminal merchandising in grain (whether directed from country or city) is founded not on the scope of operations made statistically apparent by contrasting post-harvest cash prices of wheat with the cash prices in May and June, but is the result of varying changes in premium of cash wheat over futures combined with efficiency in management. The statistical spread is only one factor in the operation.

Put in another way, there is no such thing as making money systematically by buying wheat in the fall and selling the unchanged wheat unhedged in the spring; or by buying wheat and hedging it in the fall and selling the unchanged wheat and closing out the original hedge in the spring. But there is profit to the efficient grain dealer, on the average, in buying wheat and hedging it after the harvest and merchandising it and handling the hedging account through the remainder of the crop year in accordance with varying developments in the market. Quite routinely in certain markets, the grain dealer will buy wheat in the fall when the December future is not high enough above the cash to more than cover bare interest and insurance, in the expectation that the spread between December and May will widen and cash premiums develop, which together will work out an assured profit.

Without going into further details, the experiences of the grain trade in most terminal markets warrant the following exposition. No terminal elevator can be operated as a public warehouse, leasing storage space for grain at the published rates, the operator not engaging in trade in grain; except in unusual years, not enough space would be leased to the public to cover insurance on the buildings and interest on investment. No grain house can continue in business solely with the use of leased public storage space at the published rates; except in a very unusual year, not enough grain would be bought and so stored to make the business remunerative. A grain merchant cannot afford to pay cash for

storage at the published rates; an elevator cannot lease much space for cash at the published rates.¹ Combined, the two operations can succeed; separated, success is impossible for either. In effect, the elevator man cuts the storage rate to himself as grain dealer; as grain dealer, he uses storage space of himself as elevator man when he would not engage space if he had to pay cash for it at published rates. On the basis of published rates, the elevator man loses money; but as grain merchant he makes money. The net result is profit in the business of the combined grain dealer-elevator man. When the business operations of these grain houses are accounted, it is found that practically never are storage charges corresponding to the published rates secured by the elevator; a low storage charge is secured, then money is made in merchandising operations. In a sense, the running of the elevator is a side line, a necessary evil, to be run at little or no profit, in order to protect the grain dealer and widen his opportunities for merchandising wheat. The profits lie in merchandising; storage of wheat is an incident, and the rates of storage are bookkeeping entries. It seems established that if grain elevators are to be made available as public utilities, offering storage space on lease but unconnected with grain houses, these must be provided by states or municipalities; they cannot be maintained remuneratively as commercial enterprises.² The problem, if it be one, is unsolved in our terminal markets.

¹ In other terminal markets than Chicago, especially in Duluth and Minneapolis, there is considerable leasing of public storage space by grain merchants, and this is necessarily the case at seaports. Millers quite generally lease storage space, though this varies widely from year to year.

² "A possible remedy for the existing situation is to make it practicable for grain dealers not operating elevators to store grain in public elevators in competition with the big elevator merchandisers. To accomplish this would apparently require a reduction in storage charges. But the indications are that even at present storage rates a purely storage and transfer elevator cannot be profitably operated at interior terminal points. This difficulty might be met in either of two ways. The railroads might be required to operate elevators for the convenience of their shippers; or the government, presumably the State government, might operate storage elevators at rates sufficiently low to permit dealers without elevators to compete with the elevator merchandisers." Federal Trade Commission, *Terminal Grain Marketing* (Report . . . on the Grain Trade, Vol. 3), 1922, p. xv.

SUMMARY

In consequence of the cost of carrying wheat (disregarding the price difficulties in transition from one crop year to the next) the price of wheat tends to rise through the crop year. In most years the price rises from August to May, not as a straight line but rather as an irregular curve.

Other factors influencing wheat prices disturb this recurring seasonal price variation, which may be exaggerated, minimized, or obliterated entirely. Thus, under exceptional circumstances, the May price will rise above the August price by several times the carrying charges, or the May price may be lower than the August price. The course of prices from the beginning to the end of the crop year, the crop-year price movement, is a composite of the recurring seasonal price variation, conjoined with the elevating or depressing price effect of a number of possible price factors. These intercurrent factors are intermittent rather than continuous, but enter so often and so effectively into the field of price influence that the crop-year price movement is more often exceptional than conforming to expectations based on the recurring seasonal price variation.

If one will regard the price variations as revealed month after month from August to May at Minneapolis, St. Louis, and Kansas City, supplement these with corresponding figures for spot wheat and futures at Chicago, and with such prices in Winnipeg as are available, and evaluate them in the light of the wheat price levels of the crop years, the reasonable interpretation of the course of wheat prices through a crop year would run somewhat as follows. When

there is no change in the wheat price level of the crop year and other things are equal, the price spread between August and May (October to May for spring wheat) ought in many years to equal the minimal cost of carrying wheat in terminals over eight or nine months. This set of assumptions, however, constitutes the exception rather than the rule, because other things are not equal and the wheat price level remains unchanged only occasionally. Commonly, the spread from August to May varies from year to year, a few cents above or a few cents below the bare carrying charge, more often below. If one uses the effective carrying charge—not the formal published carrying charge but the actual carrying charge that elevators are able to get along with—the crop years in which the spread between August and May equals the carrying charge would represent a larger proportion than is now the case.

According to averages, the spread in price of wheat from August to May since the war has been relatively higher than before the war. But the average is misleading on account of the occurrence of two years of exceptionally high wheat prices in the spring.

Without going at this time into the relations of cash and future prices, it is clear that as a routine procedure grain merchants cannot rely on the recurring seasonal price variation to cover the carrying expenses. It is the mixing of wheats, the merchandising of wheats on the basis of quality, and the spreading of hedges that make it possible for grain merchants to purchase wheats in the fall and dispose of them remuneratively throughout the remainder of the crop year.

VI. INTER-SEASONAL PRICE VARIATIONS

An important class of variations in wheat prices comprises the shifts in the wheat price level from one crop year to another. These we venture to term inter-seasonal variations. Like the recurring seasonal variations, they are commonly obscured by fluctuations within a crop year, and are not readily disentangled from the complex fluctuations revealed by price data. They

tend to be especially pronounced in countries, like Canada and the United States, which are heavy producers and exporters of wheat, and less pronounced in countries, such as Great Britain, which import large quantities of wheat from several exporting countries which have different harvest periods. Occasionally, radical shifts in the price level occur within the crop year, as a

result of extreme developments in an important exporting country with a different harvest period—such as happened in 1925–26 in consequence of unexpected crop damage in Argentina.

CONCEPT OF WHEAT PRICE LEVEL

The concept of a wheat price level, like that of the general level of prices, is not difficult to grasp, though it is not easy to define or express in concrete terms. As we have already emphasized, wheat is not a unity, but a collection of types, varieties, grades, and qualities, in proportions that vary from year to year and in shorter periods, and with quite different values. Accordingly the price of wheat is not a point but a range, and a range which varies in width from time to time in any market or region and in height as well as width from region to region. With full recognition of this fact one may, in order to avoid the clumsiness of using a range, secure for any market or region a weighted average of the prices of all wheats within the range, or of the more significant wheats, or of certain wheats of major significance; and use such an average, with due reservations, as an index or condensed expression of the wheat price level.

Over periods of weeks, months, and years, the range itself, or an index derived therefrom, will rarely move horizontally; rather it will display movements up and down, some of brief duration, others well sustained. These movements represent fluctuations and shifts in the wheat price level, which are to be distinguished from variations in the relative prices of particular wheats whose prices enter into that level. However difficult it may be to define precisely what we mean by the price level, or to state just what it is in cents per bushel, we have no difficulty in apprehending that *wheat* is high or low, as compared with some other period or with some notion of what is usual or “normal,” or that it is rising or falling, or that soft winter wheat is “out of line.”

It is difficult in advance, or at the onset, to diagnose, so to speak, a shift in the price level, as distinguished from a temporary variation; but this is usually easy in a subsequent review of the crop year. It is in

their ability to foresee shifts in the price level that some professional speculators show their greatest superiority over amateurs. The range of wheat prices may rise or fall as a block, or the price of one type may change more than that of the others. The general run of cash prices may rise while premiums decline or premiums may rise while the general run of cash prices decline, or premiums may go upward or downward with the general run of cash prices, though not proportionally.

From the concept of a wheat price level at a particular moment of time it is but a short step to the concept of a wheat price level over a period—a day, a week, a month, a quarter, or a crop year. The crop year is the most significant period, for the wheat crop of any one region is harvested within a few weeks and is not subject to addition from domestic sources until the ensuing harvest. Because of considerable variations in the size, composition, and character of crops from one year to another, and because demand is comparatively inelastic, substantial shifts in the price level from one crop year to another occur frequently.

These shifts are not identical in different markets or different regions. Indeed, striking regional divergencies occur; in many countries wheat prices were on a lower level in 1925–26 than in 1924–25, whereas in the United States, in consequence of a short crop of winter wheat and high tariff protection, the level was higher in 1925–26 than in 1924–25. No one market, at least in a single exporting country, dominates all other markets.¹

The demarcation between two successive crop years is at best somewhat arbitrary. Even in the United States the harvest periods for winter wheat and spring wheat are several weeks apart. Since winter wheat predominates, the crop year commonly used runs from July to June; but the spring-wheat crop, for which the appropriate crop year is September–August, is sufficiently important to prevent July 1 from being a wholly satisfactory dividing line. Moreover,

¹ Cf. G. F. Warren and F. A. Pearson, *Interrelationships of Supply and Price* (Cornell University Agricultural Experiment Station Bulletin 466), March 1928, p. 64.

other countries with quite different crop years (Canada, October–September; Argentina, January–December; Australia, December–November) are large competitors in international wheat markets from which influences arise and react upon United States markets. Furthermore, it is not only the actual harvest that influences the price level when the wheat is ready for market. Crop prospects exert considerable influence for several months before harvest, and the carryover from the old crop affects prices in the early part of a year or throughout it. The inter-seasonal shifts are seldom extremely abrupt, but in some years they are more gradual than in others. Apparently June, July, and August are the commonest months of transition.

The “hangover” influence of the last crop year is likely to be limited to the first months of the current crop year, and will ordinarily influence the weighted price to no pronounced extent. The price influence of the coming crop year may appear quite early in the current crop year, in the event that fall-sown wheat in the Northern Hemisphere goes into the winter under unfavorable circumstances. Later, the degree of winterkilling of the winter wheat of the coming crop year and the conditions of seeding of the spring wheat of the coming crop year may have a pronounced influence on the price of wheat during the current year, through an interval extending from March to July. It is possible to find crop years of which one may say that the wheat price level of the crop year was determined largely by relations of supply and demand within the year, without substantial modification by influences from the previous or the succeeding crop year. On the other hand, it is possible to find crop years in which the price level of the crop year was substantially modified from what it would otherwise have been by influences dating from the crop year preceding it or developments of the crop year succeeding it. It is certainly the rule, rather than the exception, to have the wheat price level of a crop year determined in part by influences outside of the year and not alone by relations of supply and demand within the crop year.

In some years prices remain close to an average figure throughout the season and

the concept of a price level characteristic of the season is clearly applicable. The average appears to represent accurately the price level of the season. But in other years prices remain close to a given level through a considerable portion of the season, and then depart widely from this level for part of the season—perhaps at the beginning of the season, more often at the end, sometimes for a month or two at some time during the season. One naturally thinks of the level maintained during most of the season as the representative level of the season and regards the exceptional period as unrepresentative. An average including the period of extreme prices may appear to fail properly to represent the price level most significantly characterizing the season. In still other years, price fluctuations are so great or the levels during different months so diverse that an attempt to conceive of any one price level as characteristic of the season puts a severe strain on the imagination. In such case, although an average may be computed with any desired mathematical accuracy, it can hardly be regarded as representative in any but a purely formal sense.

Though in most years some one price level appears, in retrospect, adequately representative of the price through the season or through most of the season, it is not easy to discern, while it is being developed from day to day, the price level that will later be shown to be characteristic of the crop year, or even whether any one level will appear truly representative. In an occasional crop year with clear relation of supply to demand and easy adjustment of exporters’ surpluses to importers’ requirements, there may suddenly appear in the winter or spring a war rumor or a scare of widespread crop failure. Such possibilities being imponderable, everyone in every country tries to play safe and the world price of wheat rises as the expression of prevision and insurance against disaster. Later the possibility of war is dissipated, or the crop failure is averted and a harvest secured approximating the amount anticipated before the scare of crop failure arose; the price declines to where it would presumably have been had the untoward development not occurred. But the weighted price of the

year is substantially higher than it otherwise would have been. One must not play loosely with the word "characteristic"; but clearly some wheat price levels are more characteristic than others in their relations to the demonstrable and verified factors of supply and demand.

Other factors also enter. Even though the wheat price level of two successive crop years may later turn out to be the same, price movements will occur, or may occur, between May and September, particularly in the futures market, but also in cash wheat. These represent the adjustments in the trade, adjustments of mills to different qualities in the two crops, and also differences of opinion as to the incoming crop. In some years they are due to squeezes in the closing of the month of exchange trading. Apparently it is not to be expected, even with crops identical in quantity and quality and with no change in the international situation, that the transition from the close of the one crop year to the harvest of the following crop year can be traversed with that minimum of price fluctuation observed prior to and subsequent to the period of transition. It is common to find considerable fluctuation of price with the transfer of futures from May to July and from July to September. Futures trading is designed to smooth out the difficulties in the transition from one crop year to another; but sometimes it seems to exaggerate or prolong them.

SERIES SHOWING INTER-SEASONAL VARIATIONS

From what has been said it follows that the wheat price level is almost continually in movement, and that the inter-seasonal variations are only one type, though often the major one, of the changes in level. A really trustworthy view of the actual movement can be obtained only from monthly data, or from smooth curves run through daily or weekly prices. Crop-year averages of daily or monthly prices give an exaggerated impression of the sharpness of price transitions from one crop year to another. Nevertheless, such averages are helpful in focusing attention upon the inter-seasonal variations.

As convenient indications of the price level one may select from a large number

of series. We have chosen several series which are given in Table 10, in terms of annual averages for July-June years, for the three seven-year periods previously used. Five of these series are the same as those used in earlier tables—weighted average prices of No. 1 Northern Spring at Minneapolis, No. 2 Red Winter at St. Louis, and No. 2 Hard Winter at Kansas City; and unweighted monthly averages of daily closing prices of No. 1 Manitoba Northern at Winnipeg and of good average quality imported red at Liverpool. Further we have used average monthly prices of wheat exported from the United States to Europe and of wheat imported into the United Kingdom.

The figures given in Table 10 are not the annual averages of monthly items given in Appendix Tables II-VII, but these averages after certain adjustments. The bare figures, as derived, are not properly comparable because of changes in the value of the dollar over the period. This bias may be roughly eliminated by dividing the average wheat prices in each year by the all-commodity wholesale price index number (on a 1913 base) for that year. For adjustments of all the series shown, we have employed the all-commodity wholesale price index number of the U.S. Bureau of Labor Statistics computed for fiscal years. The British series had already been converted into United States currency equivalents, and the Canadian series is expressed in what is almost equivalent to United States currency. This enables us to review, on a roughly comparable monetary basis, the seven series of prices over three seven-year periods.

It is not to be assumed that the averages for the year given in these tables closely represent the wheat price levels of the years as they might be secured from more comprehensive data. This is true especially for the prices of particular grades; although these are the most representative grades from the milling standpoint, the wheats of these grades are not represented in the crops in the same proportions year after year. In the case of the American wheats, the post-war averages are not as trustworthy as the pre-war averages on account of differences in premiums for protein. Reservations concerning the other series

TABLE 10.—ANNUAL AVERAGE PRICES OF WHEAT, 1900-01 TO 1913-14 AND 1921-22 TO 1927-28, ADJUSTED BY WHOLESALE INDEX NUMBERS ON 1913 BASE*

(Cents per bushel)

Crop year July-June	No. 1 North- ern Spring— Minneapolis		No. 2 Red Winter— St. Louis		No. 2 Hard Winter— Kansas City		Exports from U.S. to Europe	No. 1 Manito- ba Northern— Winnipeg	Average red, spot— Liverpool	Imports into United Kingdom	
	(A)	(B)	(A)	(B)	(A)	(B)	(A)	(B)	(B)	(A)	(B)
1900-01.....	94	94	94	93	86	86	93	...	110	114	113
1901-02.....	87	87	90	96	84	87	90	...	107	106	106
1902-03.....	87	87	82	83	79	79	88	...	103	101	101
1903-04.....	105	105	101	112	91	94	95	...	106	105	105
1904-05.....	128	128	121	129	113	118	103	...	110	108	108
1905-06.....	99	99	104	105	92	92	94	...	113	108	109
1906-07.....	90	90	83	86	79	80	87	...	102	100	99
Average.	99	99	96	101	89	91	93	...	107	106	106
1907-08.....	116	116	105	107	102	104	110	...	120	118	119
1908-09.....	124	123	112	126	107	119	110	...	129	124	124
1909-10.....	107	110	111	117	105	106	101	102	118	116	116
1910-11.....	110	110	104	102	103	98	98	101	112	109	109
1911-12.....	112	112	98	105	101	106	98	103	117	112	113
1912-13.....	87	90	105	106	88	87	98	92	114	110	110
1913-14.....	89	90	90	93	85	86	97	90	107	106	106
Average.	106	107	104	108	99	101	102	98	117	114	114
1921-22.....	100	103	89	91	84	85	96	91	106	109	108
1922-23.....	77	79	78	82	73	72	81	72	92	90	90
1923-24.....	78	79	71	74	70	71	75	67	84	81	81
1924-25.....	101	102	103	111	87	97	104	107	117	111	113
1925-26.....	103	104	109	110	105	104	102	97	113	109	110
1926-27.....	99	100	94	93	92	93	100	99	116	112	112
1927-28.....	92	95	101	108	92	94	96	101	108	106	106
Average.	93	95	92	96	86	88	93	91	105	103	103

* Based upon annual averages given in Appendix Tables II-VII, except for United States export prices, which are from *Commerce and Navigation of the United States and Monthly Summary of Foreign Commerce*. The averages for the three seven-year periods are simple arithmetic averages of the annual prices. The columns headed (A) represent adjusted weighted average annual prices; the columns headed (B) represent adjusted unweighted annual averages of monthly weighted average prices. Adjusted prices computed by Food Research Institute with the use of July-June averages of the monthly all-commodity wholesale price index numbers of the U.S. Bureau of Labor Statistics, 1913 base, which run as follows:

1900-01	78.9	1907-08	91.5	1921-22	142.3
1901-02	81.4	1908-09	92.9	1922-23	155.7
1902-03	86.6	1909-10	101.5	1923-24	150.3
1903-04	84.8	1910-11	95.2	1924-25	154.8
1904-05	86.1	1911-12	95.8	1925-26	155.7
1905-06	86.8	1912-13	100.1	1926-27	147.2
1906-07	91.2	1913-14	99.0	1927-28	147.4

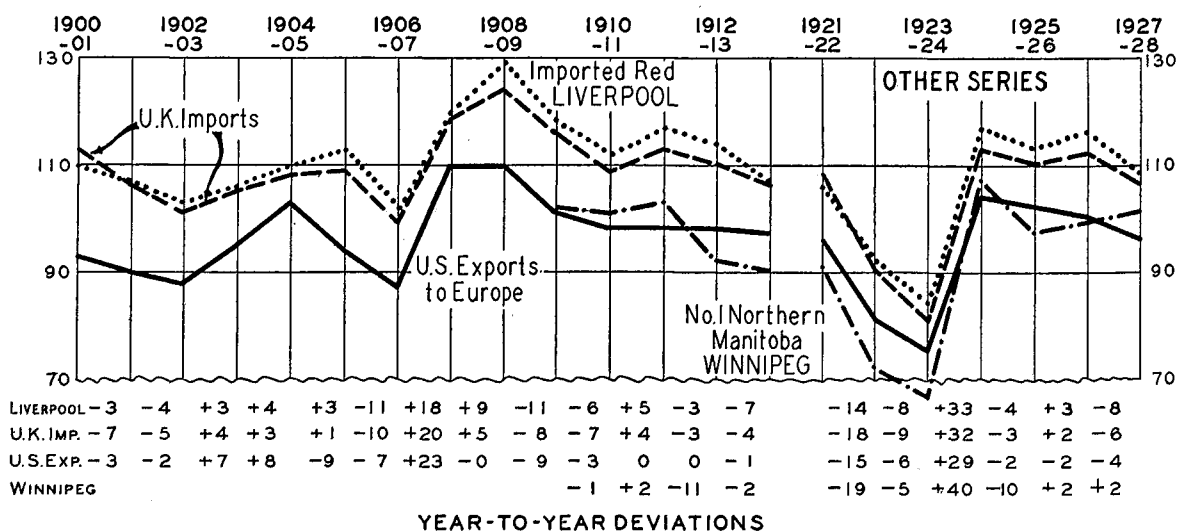
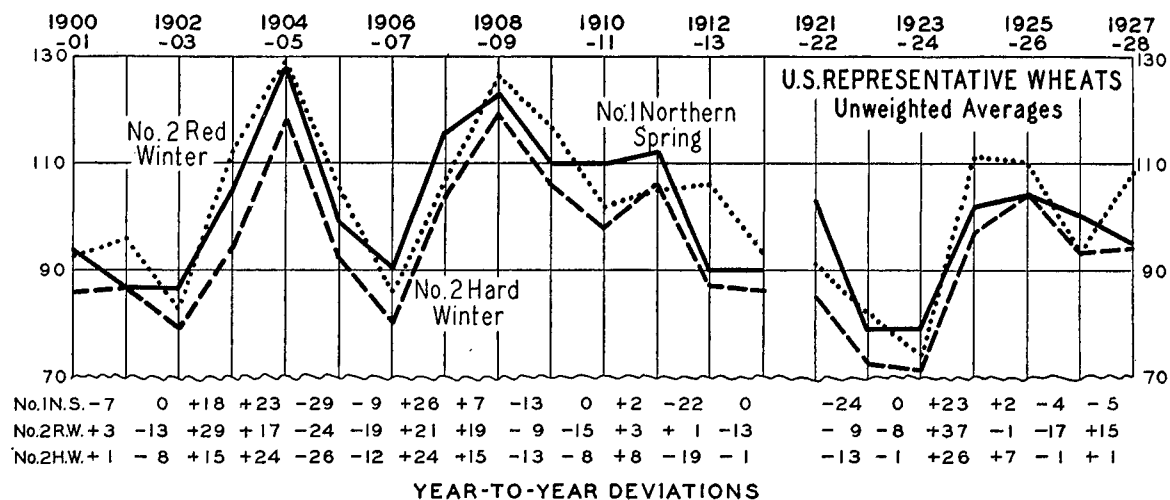
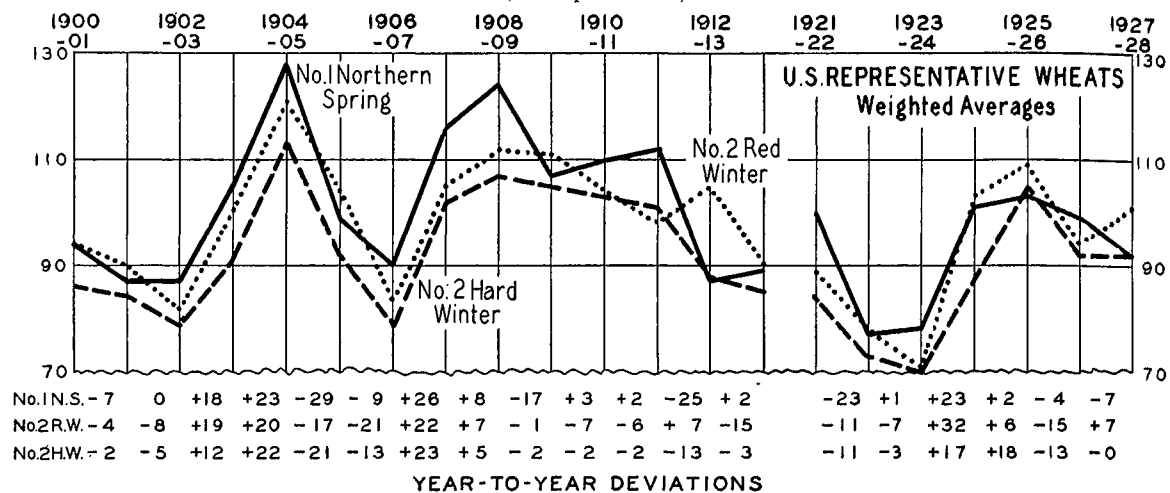
could properly be made. Nevertheless, with full consideration of all qualifying circumstances and of the fact that the price of wheat is really a range, the averages given may be taken as broad indication of the relative position of the wheat price level in different years.

COMMENTS ON THE SERIES

The adjusted prices are shown graphically in Chart 5 (p. 280). Annual averages of the monthly items of the three series of

representative American wheats are shown in the first section in terms of weighted averages, and in the second section in terms of unweighted averages. The unweighted averages are usually higher, but in most cases not much higher. Weighting makes the most difference in the case of No. 2 Red Winter, and the position and conformation of its curve are quite different in the two sections. In the third section the other series are shown in terms of adjusted prices. The year-to-year deviations are

CHART 5.—ANNUAL AVERAGE PRICES, ADJUSTED BY WHOLESALE PRICE INDEX NUMBERS ON 1913 BASE*
(Cents per bushel)



* Data in Table 10 and Appendix Table XIV. For United States exports to Europe, weighted averages; and for Liverpool, United Kingdom imports, and Winnipeg, unweighted averages of monthly items.

shown in figures in each section of the chart.

In certain respects the curves are broadly in accord. The highest sustained level of prices was reached in the years 1907-08 to 1911-12; the lowest level of prices in 1923-24, with 1922-23 a close second. If years of conspicuously high and conspicuously low prices are ignored, the price levels in the three periods are not far apart; but because of the different distribution of years of high and low prices, seven-year averages show the second period distinctly the highest in level, and the post-war period slightly lower than the period 1900-07.

In detail, as one might expect, the consonance of the series as reflectors of the wheat price level is far from perfect, in respect to degree of change and, in some cases, to direction of movement as well. The outstanding case of disagreement in degree of change occurred in the first seven-year period. From 1902-03 to 1904-05 prices of representative wheats in the United States rose sharply, following two short crops in the United States, to the highest level in the 21 years, and declined sharply in the two following years; whereas the series of United States export prices shows a much more moderate movement in this period, and the two British series a movement still more moderate. The British series reached no peak in 1904-05, and did not decline in 1905-06 as all of the American series did. In the three or four years just before the war, the downward trend of prices was considerable and erratic in the three American series and the Winnipeg series, but very moderate in the two British series, and almost imperceptible in the prices of United States wheat exported to Europe. In the post-war period, again, considerable divergence among the series is apparent, except for the general agreement upon 1923-24 as the year of lowest prices and upon 1924-25 as showing the greatest advance.

The two British series move rather closely together. In all but two instances (1900-01 and 1921-22) the unweighted average price of imported red wheat is higher, but never by more than a few cents a bushel. The comparison is but little altered if one uses a weighted average of

monthly import prices instead of an unweighted average. The differences are probably due mainly to the fact that imported wheats which do not enter into the series of red wheat prices average lower in price either in general or in particular months of heavy imports of these wheats.

Among the three series of United States representative wheats, No. 2 Hard Winter is almost invariably the lowest, but No. 2 Red Winter and No. 1 Northern Spring change their relative positions frequently. Conspicuous cases of divergence in direction or extent of deviations, or both, are readily observed. On the whole, judged by the unweighted averages for the periods, No. 2 Red Winter shows the greatest inter-seasonal variation in price. Medians of the deviations show No. 1 Northern Spring as the least variable, and it has the greatest number of small inter-seasonal variations; but these are due largely to the fact that its inter-seasonal variations tend frequently to be reduced by the overlapping of its true crop year (September-August) with that of winter wheat (July-June).

In one year, 1922-23, the deviation for No. 1 Northern differed by 11 cents from that of No. 2 Hard (using unweighted average prices). In three years, 1902-03, 1908-09, and 1910-11, the difference was 8 cents. In 1926-27 it was 7 cents, in 1901-02 and 1911-12, 6 cents, in 1925-26, 5 cents. In one year, 1912-13, the deviation for No. 2 Red differed from that for No. 2 Hard by 18 cents; in two years, 1903-04 and 1927-28, the difference was 14 cents; in 1913-14 it was 12 cents and in 1924-25 it was 11 cents; and in six additional years it was over 5 cents. The divergencies appear to arise largely from differences in relative size of the crops of the three classes of wheat, from changes in the average quality of the crops from year to year, and from differences in the abundance of wheats showing the peculiar milling and baking characteristics represented respectively by these three classes. Other factors also must play a part in creating these differences.

Price differences arising from peculiar qualities of the wheats are much more pronounced in the American markets where the wheat is largely bought on sample and selected for particular characteristics and

where there is a representative offering of the various qualities within the grade, than in the British market where the American wheat is largely bought on grade and where the wheat received is the remnant of the crop after the most desirable portions have been picked out by American millers. The British market, furthermore, drawing wheat from all the principal producing sections of the world, less frequently suffers from shortage of supplies of particular qualities than markets which draw on a limited territory.

The range of variations shown by the adjusted figures (1913 base) in Table 10 and in Appendix Table XIV are summarized below, using unweighted annual averages for the three representative United States wheats and British import prices, in cents per bushel:

	No. 1 Northern Spring	No. 2 Red Winter	No. 2 Hard Winter	U.S. export prices	Liverpool imported red	U.K. import prices
High	128	129	119	110	129	124
Median	100	105	93	97	110	109
Low	79	74	71	75	84	81
Range	49	55	48	35	45	43
Extreme one-year deviation	29	37	26	29	33	32
Extreme two-year deviation	41	46	39	27	29	29

The ranges are around 50 per cent of the median prices, in the case of representative United States wheats, but considerably less in the export and import series. In exceptional years the inter-seasonal variation may cover one-half to three-fourths of this range, and between one year and the second year following, it may run higher still.

All but one of the series show the largest inter-seasonal variation between 1923-24 and 1924-25: No. 1 Manitoba Northern rose 40 cents, No. 2 Red Winter 37 cents (unweighted average), imported red at Liverpool 33 cents, British import prices (unweighted average) 32 cents, United States export prices 29 cents, and No. 2 Hard Winter (unweighted average) 26 cents. The 23-cent change in No. 1 Northern Spring (un-

weighted average) in 1924-25, however, was equaled in 1904-05 and exceeded in 1905-06 (-29 cents), 1907-08 (+26 cents), and 1922-23 (-24 cents), and was almost equaled in 1912-13 (-22 cents). The maximum two-year rise occurred in 1902-03 to 1904-05 for No. 1 Northern Spring and No. 2 Red Winter, and in these years and 1906-07 to 1908-09 for No. 2 Hard Winter, and between 1923-24 and 1925-26 in the other series, except No. 1 Manitoba Northern, for which it occurred between 1922-23 and 1924-25. In the case of the three representative United States wheats, the maximum two-year variation downward before the war, from 1904-05 to 1906-07, was greater than any two-year deviation, positive or negative, in the last period. The maximum two-year deviation regardless of signs occurred between 1902-03 and 1904-05 in No. 1 Northern Spring and No. 2 Red Winter. Averages by seven-year periods show the maximum inter-seasonal variation in the first period in United States representative wheats, in the third period in the other series; it is rather noteworthy that in spite of the pronounced shift in price level between 1923-24 and 1924-25, the post-war period as a whole, subsequent to the general price decline in 1920-21, fails to show the maximum year-to-year variability, as judged by averages of domestic prices.

It will be observed that the different series do not entirely agree in respect to the direction of the price change from year to year. In the years 1910-11 to 1913-14, 1923-24, 1925-26, and 1927-28 the four American weighted price series show some variation in signs of deviations. The most extreme case of divergence was in 1912-13, when No. 2 Red Winter showed a rise of 7 cents while No. 1 Northern showed a decline of 25 cents and No. 2 Hard a decline of 13 cents. In extent of change, even where the signs of the deviations are the same, there is much less consistency, and there are striking differences in several cases. These differences are more numerous if one includes in the survey the two British series. In view of these inconsistencies, one clearly cannot rely upon any one series to express the course of wheat price level, and one must generally rest content with fairly broad statements concerning it.

CAUSES OF INTER-SEASONAL VARIATIONS

The inter-seasonal price variations, or shifts in the wheat price level from one crop year to another, are due partly to domestic influences, but in large part are related to corresponding movements in the world price of wheat. Domestic circumstances determine whether the price of a particular variety follows the world price more or less closely; but the direction of movement is usually consistent. Throughout the period under review, American production of wheat has been one of the factors in the upward or downward movement of world price; at the same time, changes in the world price level resulting from conditions in Europe or in the other surplus-producing countries have been reflected back to the American price. Whether the American price lags behind the world price, or anticipates it, and the extent to which the American price and the world price are respectively modified, vary from season to season. Many Europeans tend to exaggerate the American influence on the world price, and many Americans tend to exaggerate the world influence on American price. Since the war, the tariff has modified the influence of world price on domestic wheat price.

The major factors causing upward or downward shifts in the American wheat price level from one crop year to another are numerous and interrelated. Now one, now another, is predominant or conspicuous. In discussions of price movements one or another is frequently overdrawn or underestimated. World crops and prices of wheat and other grains, domestic crops of wheat and other grains, domestic and world carryover and visible supplies of wheat and other grains, domestic exports, the exports of other surplus countries, importers' requirements—these all influence the American price to varying degrees in different years. A rise in domestic price level that is out of line with the contemporaneous Liverpool price will be checked, unless otherwise checked, when the point is reached where Canadian wheats enter duty paid; a decline in the domestic price level will be checked, unless otherwise checked, when domestic prices reach the export basis.

On the whole, the largest and most general deviations occur in years of a short crop, either in the United States (as in 1904-05) or in the world as a whole (as in 1907-08 and 1924-25). Also large are the shifts in years of large crops following short crops, as in 1905-06. Each of the periods yields illustrations of large inter-seasonal variations, for which the principal cause can be found in some outstanding change in the relations of supply and demand—chiefly changes in supply—at home or in the world at large. But one must not overemphasize the extent of variations. On the whole practically half of the year-to-year deviations are less than 10 cents (1913 values) a bushel, and the variations of 15 cents or more are confined to a few outstanding years, save for occasional exceptions shown by No. 1 Northern Spring and No. 2 Red Winter. What is sorely needed, though it may not be feasible, is accurate study of the correlation of American price movements with foreign price factors, following which a more exact explanation of the ever-present but varying lack of concordance would be possible.

The price of wheat in any year is also subject to influence by the prices of the other cereals, in themselves independently variable, as expression of changing relations in the equation of supply to demand of the other cereals. Lastly, the price of wheat in any year may be modified by the prices of other foodstuffs than cereals—for example, potatoes and meats. The current practices of merchandising wheat may modify somewhat the registration in price of the equation between supply and demand; but in the final analysis the supply and demand are equated in price.

The influence of speculation on price, whatever it may be on short-term and month-to-month variations, can hardly be regarded as of large importance in determination of shifts in price level from crop year to crop year. To say that prices, within a range, may be modified in a week, or a month, or over several months, by speculation, is one thing; but to say that by speculation the range of wheat prices may be elevated or depressed over a crop year, and from one crop year to another, other things being equal, is a very different matter. In

the determination of crop-year price levels, more ponderable factors than speculation are involved. At the same time, speculation and trading on established grain exchanges are of unquestioned importance in the prompt, simultaneous, and widespread registration of wheat prices on the markets of the world.

The factors determining shifts in the wheat price level of the crop year are the same as those determining variations in price within the crop year. But the weight of influence is naturally on the side of broad rather than of ephemeral factors, and considerations of physical volume predominate. Crop reports mean more and trade

opinion less. Most of the incidental and accidental factors, and the short-term intercurrent influences, are discounted in the inter-seasonal price shift. The international influence is particularly marked, since the ranges of wheat prices are related in all countries engaged in international trade in wheat. World crops and world requirements are important; exporters' surpluses and import "requirements" still more important. Important also are supplies of substitutes. Thus broadly considered, shifts in wheat price level from crop year to crop year (adjusted for monetary positions and effects of tariffs) represent changes in the equation between supply and demand.

VII. VARIABILITY OF FARM PRICES OF WHEAT

The grain trade, whether independent or co-operative, is conducted, in theory, on a strictly differential basis. For each country point there is an established margin per bushel between the price at the country elevator and at the terminal elevator in the central market. This margin is determined primarily by freight charges, commissions, etc., which are fairly constant, though subject to change with substantial changes in freight rates, the general level of prices, or the level of particular charges, and to a small extent with changes in the price of wheat itself.¹ For the crop year, the margin probably tends to be constant. Each day the country grain buyer receives reports of cash and future prices in his central market. In the case of line elevator companies, the local manager purchases wheat on instructions fixed by the terminal price of the day, or hour, upon which he bases his local price, the margin being regarded as constant. Wheat is purchased as of grade and usually hedged in the month of the future price upon which the cash price was based. Wheat may be locally overgraded or undergraded, but this is a question that must be kept distinct from the margin between the terminal price and the country

price, as of the grade. The procedure is of course the same at country points where a wheat growers' co-operative association operates or where there are elevators owned and operated by local farmers. In general it may be assumed that buying competition between line elevator companies, between private elevators locally owned, between farmers' elevators, and between farmer-owned elevators as a group and privately owned elevators as a group ought to be sufficient to insure a practically unvarying relation of country price to terminal price, as of the grade, for each country point. That is, for each country point there is the appropriate margin depending on the distance from the central market, and the country prices vary synchronously with the terminal prices for identical wheats. By synchronously is meant not the correspondence of farm and terminal prices, quotation by quotation, but day by day.

Wheat growers seem to have the impression that when terminal wheat prices decline, the movement is promptly and quantitatively reflected in the country prices; but when terminal prices rise, the movement is not promptly and quantitatively reflected in the country prices. While such a state of affairs might not be regarded as unplausible in a locality served only by privately owned elevators and without rapid dissemination of market news, it seems impossible to believe that it can now

¹ This margin is naturally more definite and stable in states producing a surplus of grain than in states which import grain. For illustration, the margin between farm prices in Kansas and terminal prices at Kansas City is more definite than between farm price in Pennsylvania and terminal price in Philadelphia.

hold in the principal wheat-growing regions. In these regions there is intense competition between grain buyers. In the country are somewhere between 4,000 and 5,000 farmer-owned elevators, most of them lying between the Alleghenies and the Rocky Mountains. At the majority of country points there is competition between farmer-owned and privately owned elevators; at some points there are only privately owned elevators, but at other points there are only farmer-owned elevators. Wheat buyers for mills canvass the hard spring- and hard winter-wheat regions extensively. Market reports of wheat prices are not only telegraphed promptly but are broadcast by radio. Under these circumstances, it is hard to believe that considerable numbers of wheat growers sell their wheat in ignorance of the terminal price. The difficulties are related not to the reflection of terminal prices back to country prices as such, but to the determination of, and agreement on, the grade and the value of their wheat for quality within the grade.

We thus arrive again at the question of the range of wheat values. Within the grade wheats are priced on milling qualities—including quantity and quality of protein, weight per bushel, yield of flour per unit, color, ash, fiber, and millability. Also, the miller must have regard for inclusion of frosted, immature, rusted, and bin-burnt kernels, which injure flour quality. Two samples of wheat of identical grade may differ in milling value from a few cents to 30 or more cents a bushel.

Not only the milling qualities within the grade, but the actual determination of the grade itself, is involved. The federal grades are coarse rather than fine and a great deal of wheat lies between grades. In practice, wheat lying between two grades is inclined to be graded down to the lower grade. This, however, depends somewhat upon competition. Where competition is intense, some wheat will be overgraded; where competition is lax, some wheat will be undergraded.

Lastly, the miller takes account of the non-wheat admixtures with the wheat. Some of these are important because they injure the flour if ground with the wheat and their removal entails expense. The

milling value of two otherwise identical wheats may be several cents per bushel apart, if in one sample certain weed seeds, not easily removable, are present even in small numbers. Wheat growers as a class are not conversant with the flour-injuring properties of seeds more or less widely present in wheats, particularly those from older regions.

From all this it follows that three separate factors are involved in the reflection of terminal wheat prices to country wheat prices. One is the comparability of the grading. The second concerns the milling qualities, particularly the content of protein. The third concerns the discount to be applied to deleterious admixtures. Frequently wheat growers are not competent to judge of the quality, or even of the grade, of their wheat. The grower seeks not only to have farm price parallel terminal price for wheats of identical values, grade for grade; he seeks also to have country grading parallel terminal grading and to have country classification of value parallel terminal classification of value.

Direct information on variations in farm prices is quite inadequate for a satisfactory study. We possess an extended series of farm wheat prices, based for the year on the price of December 1. The Department of Agriculture publishes monthly and annually average producers' prices of wheat, beginning with January 1908, based on the weighted averages of prices reported by crop correspondents as of the 1st or 15th of each month. These, however, are not comparable with terminal prices, chiefly because they are prices for a single day each month and because the processes of geographical averaging themselves introduce factors distorting the series from time to time. For such reasons this series does not lend itself to a study of the variability of the farm price of wheat. Conceivably one might go back into the records of line elevators and farmer-owned elevators in the principal wheat regions and compile statistical material on day-to-day, week-to-week, month-to-month variations in country prices. But no comprehensive compilations of such prices are available for analysis.

Conclusions regarding the variability of farm prices of wheat could be expressed

in terms of comparisons of the variability of farm prices in a particular region and of wholesale prices of the same classes and grades of wheat in neighboring terminal markets. As stated, country buying, whether by private elevators or co-operatives, is uniformly conducted, in important wheat-growing districts, on the basis of margins under prices at terminal markets serving the territory. Available information on these margins as they vary from region to region and from time to time is far from complete, but it is sufficient to indicate in a broad way the character and degree of fluctuations in these margins. By combining the information on variations in margins with that on variations in terminal prices a serviceable indication could be obtained of the variations in farm prices.

Mills¹ has attempted an appraisal of the variability of farm prices contrasted with wholesale prices. For wheat he used the December 1 farm price in Kansas with the December price of wheat in Chicago. This comparison indicated a slightly larger measure of variability of farm price than of wholesale price. The greater variability of farm prices is to be expected on the theory that farm prices follow wholesale prices closely, since the measure of variability is in terms of percentage changes and a 10-cent change represents a larger percentage of the farm price than of the wholesale price.

The largest element in the margin between prices of wheat at terminal markets and prices at tributary country points in the principal wheat-growing areas is usually the freight. This element in the margin is subject to only infrequent changes, and such changes bear no relation to changes in the price of wheat except over long periods, when both move in sympathy with a sustained change in the general price level. The remainder of the margin represents the gross profit of the country elevator or other handler, co-operative or independent, and from it must be derived the principal income to cover costs of opera-

tion and net profits. The element in the margin, over and above freight, varies from place to place according to the type of elevator, according to the volume of business done, and other conditions affecting the operating cost per bushel, and according to the severity of competition. The buying margin at any one country point may vary also with the season of the year, with the condition of the market, and with the grade of the wheat.

The Federal Trade Commission, in its investigation on the grain trade, made a fairly detailed study of buying margins for wheat in the spring-wheat territory, covering the five years 1912-13 to 1916-17. Average margins for the different types of elevators stood in different relationships in the several years and exhibited no pronounced differences for the period as a whole. Margins on No. 3 Northern were uniformly slightly higher than on No. 1 Northern. The averages for the four years 1912-13 to 1915-16 ranged from 3.24 cents to 5.99 cents for No. 1 and from 3.52 cents to 8.70 cents for No. 3. If 1916-17 (clearly an abnormal year) be included, the highest annual average margins are 11.55 and 15.03 cents respectively. The margins by years were as follows:²

Year	Cents per bushel		Percentage of average price	
	No. 1 Northern	No. 3 Northern	No. 1 Northern	No. 3 Northern
1912-13	4.64	5.83	5.1	6.8
1913-14	3.24	3.52	3.6	4.1
1914-15	5.99	8.70	4.6	7.0
1915-16	5.50	7.26	4.6	6.5
1916-17	11.55	15.03	5.8	8.1

The average margin was found to be appreciably higher in the months of light crop movement. The seasonal variation for the crop years 1912-17 is shown in the following figures, in cents per bushel:³

Month	No. 1 Northern	No. 3 Northern
July	5.58	10.80
August	7.55	12.16
September	4.92	8.83
October	5.36	7.24
November	4.84	7.46
December	4.84	8.70
January	5.85	12.81
February	5.54	9.50
March	6.09	10.70
April	7.81	15.00
May	11.85	21.96
June	5.99	18.88

¹ *The Behavior of Prices*, pp. 53-54.

² Data from Federal Trade Commission, *Country Grain Marketing* (Report . . . on the Grain Trade, Vol. 1), September 15, 1920, p. 195.

³ *Op. cit.*, p. 194.

Interviews with elevator operators are summarized in the Trade Commission's report as bearing out the facts shown in the statistics above and indicating, as is suggested by the statistics, that in periods of wide fluctuations in terminal prices the elevator operator takes a wider margin. Just how he was in position to exact it was not made clear. The explanation offered was that in periods of wide fluctuations the buyer's risks are increased.

Though margins in cents per bushel were shown by these figures to be several times as large in some years as in other years, the variation in margins, expressed as a percentage of the price of wheat, is not great. Compared with the variations in terminal prices of wheat, the variations in elevators' buying margins appear small. Their variations cannot raise the variability of farm prices much above the variability of terminal prices, both expressed in cents per bushel. Expressed in percentages, the increase must appear larger, because a 10-cent change is a larger percentage of the farm price than of the terminal price. It may be questioned, however, whether the variation in margins does not tend to make farm prices more stable, expressed in cents per bushel, than terminal prices. The widening of margins in years of high prices tends to cause farm prices to rise less than terminal prices; the narrowing of margins in years of low prices tends to cause farm prices to fall less. Altogether, it appears clear that the variability of farm prices, expressed in cents per bushel, must be nearly identical with the variability of wholesale prices in the neighboring terminals.

There are reasons for doubting whether the findings of the Federal Trade Commission on variability of margins between farm price and terminal price hold for present conditions. Federal grade standards were lacking in the period covered by its study, and grading is closer nowadays. Freight car service is better than it was before the war, which makes for uniformity of margins. The cost of credit for country grain dealers is more nearly uniform than before the war. Market information is more promptly and widely disseminated than was the case twenty years ago. In short, contrasted with the pre-war period, several

factors in grain handling make for uniformity in the margins representing country handling charges.

The strict method of determining the influence of the recurring seasonal movement of terminal wheat price on the weighted farm price of the crop would be to eliminate the effects of short-term fluctuations, of the secular trend, and of change in the price level. So far as we are aware, this has never been undertaken. What has been attempted, instead, has been to compare prices in the fall with those in the spring and learn whether the differences in price were more than sufficient to cover the costs of carrying the wheat over the winter.

In an earlier section we found ourselves, on the basis of available price material, unable to reach the conclusion that wheat could be routinely purchased after the harvest, stored in terminals, and sold in the spring at a profit over gross carrying charges. But it does not follow that because it is impossible thus to carry wheat over the winter at a terminal, it might not be possible to carry it over on the farm. In the year when it is possible to carry wheat in terminals from fall to spring with net profit, it would be still more easily possible to carry it with net profit on farms. In a year in which it was barely not possible with profit to carry wheat in terminals over the winter, it might be barely possible with profit to carry it over the winter on the farm. In general, the presumption would be that the possibility of carrying wheat over the winter on the farm at a net profit would be parallel to the circumstances in terminals, with some advantage in favor of the farm.

But in a different sense it is sometimes possible to carry wheat on the farm at a profit, at least over several months. In occasional years the price of September and December futures is so high in the early summer that the hard winter-wheat grower, whose crop is practically made, could sell futures for September or December (to the extent of somewhat less than his crop) and make delivery from the crop. Sometimes the spring-wheat grower can do this in the May future, when trading is first opened for that month. Or he could sell a future and buy it in when he delivers his wheat.

This is really not a form of speculation; it is a form of cash sale with deferred delivery and payment. For a trader to do this would be pure speculation, because he has not the wheat to deliver; for the grower it

is not speculation because he has the wheat to deliver. It is a form of carrying wheat in expectation of a higher price, determined at once on the basis of futures. It is a regular practice of the Canadian pools.

VIII. COMPARISON OF PRE-WAR AND POST-WAR VARIATIONS

It seems to be widely believed that since the war (the post-war period regarded as beginning in July 1921) the fluctuations of wheat prices have been much more pronounced than before the war. If the change in the purchasing power of money applies to marketing and distributive services in the same manner as to goods, one might expect that fluctuations in wheat prices since the war would bear to fluctuations before the war a ratio corresponding to that of the wholesale price index numbers. This much is broadly true. Altered circumstances in the wheat trade would seem to make reasonable the expectation that fluctuations in wheat prices would be wider since the war than they were before the war, even in terms of dollars of the same purchasing power. There have been several significant shifts in the wheat price level since July 1921; and all forms of intra-seasonal price fluctuations tend to be exaggerated with a shift from one price level to another. The international trade in wheat has been greatly augmented; more countries are involved, in particular the ex-European trade has expanded; more countries are exporters and more are importers. Russia and also India have for the time being become minor figures in the world trade in wheat, European imports now come almost entirely from overseas, the exports of North America have been greatly expanded. The growth of Canadian exports has shifted the world trade toward a spring-wheat basis. The United States has been alternately on and off a price export parity for different wheats, whereby the domestic prices have been alternately exposed to foreign influence, or to some extent protected from it. The tariff has had the effect of raising domestic prices since the war, though not uniformly for all kinds of wheat. We have had federal grades of wheat since the war, and not before it. Premiums for protein have become

prominent, country buying of mills has been greatly developed. These several considerations, among others, have brought it about that the domestic wheat trade is substantially different from what it was before the war. In view of these circumstances, the occasional appearance of wider price fluctuations might be regarded as not unnatural or surprising.

If one were to judge by the arithmetic means of month-to-month price changes, irrespective of the sign, as given in Table 4 (p. 257), it would seem to follow that the amplitude of the month-to-month fluctuations has increased in somewhat the same proportion as the increase in the general price level. The gross average month-to-month variation (the three American markets combined) before the war was 3.5 cents per bushel; since the war, 6.5 cents per bushel. This increase is somewhat greater than the increase of the post-war over the pre-war wholesale price index number, but it is not striking. Also, it is significant that this difference seems to hold for Canada.

But when one regards the figures for individual months more in detail, it becomes clear that the post-war averages of month-to-month price changes are the means of wider extremes than was the case before the war. A climate with a mean temperature of 70° and of which the extremes are 60° and 80° is a somewhat different climate from one with a 70° mean of which the extremes are 90° and 50°. The instances of extreme variation of price from month to month were more frequent during the post-war seven years than during the two pre-war seven-year periods. This is clearly apparent from the dispersions shown in Table 3 (p. 257). In short, while the usual plus or minus variation from month to month since the war has not been out of line with the usual plus or minus variation before the war, when adjusted for changes in price

level of wheat and in the general price level, the number of extreme fluctuations was larger after the war than before it. This conclusion is supported by reference to analysis of the price changes during the transition from one crop year to another. Outside of one extreme instance in 1909-10, the change in price from June to July at St. Louis before the war was less marked than the change from June to July since the war. The difference is not so pronounced in the

Furthermore, the year-to-year changes in the wheat price level, when reduced to the 1913 dollar, do not seem to have been significantly larger since 1921-22 than during the fourteen crop years before the war. Indeed, in view of the extraordinary nature of developments in the markets of the world since the war, it is rather surprising that the wheat price level has not shifted back and forth to a still greater extent. Table 11 contains a summary of averages

TABLE 11.—SUMMARY OF AVERAGES OF ADJUSTED ANNUAL PRICE DEVIATIONS, 1900-01 TO 1913-14 AND 1921-22 TO 1927-28*

Item	No. 1 Northern Spring— Minneapolis		No. 2 Red Winter— St. Louis		No. 2 Hard Winter— Kansas City	
	Pre-war	Post-war	Pre-war	Post-war	Pre-war	Post-war
Average of year-to-year deviations (<i>cents per bushel</i>)	12.8	10.0	11.3	13.0	9.3	10.3
The same, as percentage of average price of period (<i>per cent</i>)	12.5	10.8	11.3	14.1	9.9	12.0
Average of yearly deviations from average price of period (<i>cents per bushel</i>)	12.1	9.0	9.0	11.0	9.6	9.0
The same, as percentage of average price of period (<i>per cent</i>)	11.8	9.7	9.0	11.9	10.2	10.5

* Based on data in Table 10, p. 279 (columns 1, 3, and 5) and Appendix Table XIV, p. 300 (columns 1, 3, and 5).

Kansas City market. In the case of spring wheat at Minneapolis, the change from July to August has been more pronounced since the war than before, and this holds true still more for the spring-wheat market at Winnipeg from August to September.

Broadly considered, the monthly data disclose that what may be called the tendency to price fluctuation, when adjusted for purchasing power of money, is somewhat more pronounced since the war than before the war, and this holds for the Winnipeg market as well as for the American market. It is important to note that on the Winnipeg market, where the price of wheat is practically on the export basis, the month-to-month fluctuations, as revealed in the averages, have been even larger than in the United States. The tendency to monthly price variations in unexceptional years is not out of line with the pre-war tendency, though the price swings under exceptional circumstances have been strikingly wide.

of year-to-year price deviations, adjusted to the 1913 dollar, at Minneapolis, St. Louis, and Kansas City. Judged either in terms of cents per bushel or by percentage, it seems clear that a significant change in the amplitude of year-to-year variations has not occurred. In the case of No. 1 Northern Spring wheat at Minneapolis, the year-to-year variations during 1921-28 have been smaller than during 1900-14. In the case of No. 2 Red Winter wheat at St. Louis and No. 2 Hard Winter wheat at Kansas City, the year-to-year variations have been somewhat larger since the war than before, but the difference does not seem to be of any marked significance.

In summary, neither month-to-month nor year-to-year changes in wheat prices serve to indicate that the variability of wheat prices since the war has been of a significantly different nature, or the amplitudes of a substantially different extent, than before the war.

This issue is the work of Alonzo E. Taylor, with the co-operation of Joseph S. Davis and Holbrook Working and the assistance of Elizabeth Brand Taylor

TABLE I.—CLASSIFICATION OF WHEATS ON GRAIN EXCHANGES AT CHICAGO, MINNEAPOLIS, KANSAS CITY, AND ST. LOUIS*

Classifi- cation	Chicago	Minneapolis	Kansas City	St. Louis
Premium wheats	No. 1 Hard Spring—2c per bu. over contract No. 1 Dark Hard Winter— 1.5c per bu. over contract No. 1 Dark Northern Spring —1c per bu. over contract No. 2 Dark Hard Winter— 0.5c per bu. over contract	No. 1 Hard Spring—2c per bu. over contract No. 1 Dark Northern—1c per bu. over contract	None	None
Contract wheats	Nos. 1 and 2 Hard Winter— Nos. 1 and 2 Yellow Hard Winter— Nos. 1 and 2 Red Winter— No. 1 Northern Spring— All at contract price	No. 1 Northern Spring (See note below.)	Nos. 1 and 2 Dark Hard Winter Nos. 1 and 2 Hard Winter Nos. 1 and 2 Yellow Hard Winter	Nos. 1 and 2 Red Winter Nos. 1 and 2 Dark Hard Winter Nos. 1 and 2 Hard Winter Nos. 1 and 2 Yellow Hard Winter (Type must be specified.)
Discount wheats	No. 2 Dark Northern Spring —2c per bu. under con- tract No. 2 Northern Spring—3c per bu. under contract No. 3 Dark Hard Winter—5c per bu. under contract No. 3 Hard Winter—5c per bu. under contract No. 3 Yellow Hard Winter— 5c per bu. under contract No. 3 Red Winter—5c per bu. under contract	No. 2 Dark Northern Spring —2c per bu. under con- tract No. 2 Northern Spring—3c per bu. under contract No. 3 Dark Northern Spring —18c per bu. under con- tract No. 3 Northern Spring—20c per bu. under contract (See note below.)	No. 3 Dark Hard Winter— 5c per bu. under contract No. 3 Hard Winter—5c per bu. under contract No. 3 Yellow Hard Winter —5c per bu. under con- tract	No. 3 Red Winter—5c per bu. under contract No. 3 Dark Hard Winter— 5c per bu. under contract No. 3 Hard Winter—5c per bu. under contract No. 3 Yellow Hard Winter— 5c per bu. under contract (Type must be specified.)
Non- deliver- able wheats	Nos. 3, 4, 5 and Sample, Dark Northern Spring Nos. 3, 4, 5 and Sample, Northern Spring Nos. 1, 2, 3, 4, 5 and Sample, Red Spring Nos. 4, 5 and Sample, Dark Hard Winter Nos. 4, 5 and Sample, Hard Winter Nos. 4, 5 and Sample, Yel- low Hard Winter Nos. 4, 5 and Sample, Red Winter Mixed wheats	Nos. 4, 5 and Sample, Dark Northern Spring Nos. 4, 5 and Sample, North- ern Spring Nos. 1, 2, 3, 4, 5 and Sample, Red Spring Mixed wheats (See note below.) NOTE.—Provision is also made for delivery of Hard Win- ter wheats when so speci- fied in the contract	Nos. 4, 5 and Sample, Dark Hard Winter Nos. 4, 5 and Sample, Hard Winter Nos. 4, 5 and Sample Yel- low Hard Winter Mixed wheats	Nos. 4, 5 and Sample, Red Winter (Provision is also made for delivery of Hard Winter wheats when so specified in the contract.)

* Data from *Statistical Information Relating to Stocks, Cotton, Grain, Provisions, Live Stock and Seeds* (Howard, Bartels and Company, 1923), pp. 6-7, and from U.S. Department of Agriculture Bureau of Agricultural Economics, *Handbook of Official Grain Standards for Wheat, Shelled Corn, Oats and Rye* (August 15, 1924), pp. 5 ff.

TABLE II.—WEIGHTED AVERAGE PRICES OF REPORTED CASH SALES OF NO. 1 NORTHERN SPRING WHEAT AT MINNEAPOLIS, MONTHLY, JULY 1899 TO JUNE 1914 AND JULY 1921 TO JUNE 1928*

(Cents per bushel)

Crop year July-June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Annual averages	
													(A)	(B)
1899-1900....	70	70	69	69	65	65	65	65	65	66	66	71	67	67
1900-01.....	78	74	76	76	74	73	75	74	74	72	73	69	74	74
1901-02.....	65	69	68	62	70	74	76	74	72	73	75	75	71	71
1902-03.....	78	72	67	70	72	73	76	77	76	76	78	84	75	75
1903-04.....	86	93	85	82	80	82	88	97	97	93	94	94	89	89
1904-05.....	97	114	117	115	107	109	114	113	111	102	113	110	110	110
1905-06.....	108	98	81	86	84	85	83	81	77	79	83	84	86	86
1906-07.....	79	75	74	76	80	80	80	82	80	84	96	101	82	82
1907-08.....	102	100	108	112	103	107	110	106	107	103	109	108	106	106
1908-09.....	114	112	103	104	106	110	109	113	115	124	131	134	115	115
1909-10.....	129	106	104	104	105	112	114	114	115	111	110	109	109	111
1910-11.....	121	113	109	108	104	103	106	102	98	96	99	97	105	105
1911-12.....	99	105	109	110	105	102	106	106	108	110	116	113	107	107
1912-13.....	109	98	89	90	84	82	89	87	85	88	91	92	87	90
1913-14.....	91	88	87	84	85	86	87	93	92	91	94	92	88	89
1921-22.....	167	148	151	134	125	131	134	151	151	158	161	149	143	147
1922-23.....	149	111	110	115	123	125	123	126	124	130	128	117	120	123
1923-24.....	112	118	121	120	114	116	119	121	121	121	122	125	117	119
1924-25.....	137	131	130	146	148	166	189	187	171	150	167	164	156	157
1925-26.....	159	164	150	149	155	169	173	167	161	164	162	163	161	161
1926-27.....	172	149	143	149	146	146	143	142	139	138	147	149	146	147
1927-28.....	147	143	134	129	130	132	135	134	139	153	157	148	136	140

* Data from *Wheat and Rye Statistics* (U.S. Department of Agriculture Statistical Bulletin No. 12), January 1926, pp. 79-81; and *Agriculture Yearbook, 1927*, pp. 757-58, with supplementary data from current sources for 1928. The annual averages headed (A), like the monthly averages, represent daily prices weighted by sales; the column headed (B) represents an unweighted average of the monthly weighted averages.

TABLE III.—WEIGHTED AVERAGE PRICES OF REPORTED CASH SALES OF NO. 2 RED WINTER WHEAT AT ST. LOUIS, MONTHLY, JULY 1899 TO JUNE 1914 AND JULY 1921 TO JUNE 1928*
(Cents per bushel)

Crop year July-June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Annual averages	
													(A)	(B)
1899-1900....	71	71	70	72	70	71	71	72	72	72	71	77	72	72
1900-01.....	75	73	76	74	73	72	74	74	75	74	75	69	74	74
1901-02.....	66	71	71	72	74	84	89	86	82	80	81	78	73	78
1902-03.....	71	66	67	70	69	72	75	76	73	72	75	79	71	72
1903-04.....	80	81	85	87	87	92	93	104	105	106	108	107	86	95
1904-05.....	97	101	115	118	115	115	118	118	115	109	108	105	104	111
1905-06.....	89	85	86	92	92	93	94	92	91	95	94	88	90	91
1906-07.....	75	70	72	76	75	76	77	78	77	78	89	94	76	78
1907-08.....	89	87	95	103	96	100	103	102	102	99	102	96	96	98
1908-09.....	92	95	102	103	107	108	111	124	130	136	139	157	104	117
1909-10.....	113	112	114	123	122	128	130	127	123	112	116	102	113	119
1910-11.....	107	102	102	100	96	98	103	96	93	90	94	88	99	97
1911-12.....	84	88	94	100	96	97	102	101	104	113	121	111	94	101
1912-13.....	103	104	103	109	104	107	111	109	108	109	104	99	105	106
1913-14.....	85	88	94	93	94	95	96	95	95	94	96	84	89	92
1921-22.....	123	123	136	126	120	121	122	138	142	141	138	118	127	129
1922-23.....	112	109	114	123	129	136	137	139	136	139	133	123	121	128
1923-24.....	97	99	109	116	112	114	116	118	114	113	112	116	107	111
1924-25.....	135	138	140	156	163	179	210	202	186	177	186	189	159	172
1925-26.....	159	172	171	170	171	184	194	185	170	171	162	147	169	171
1926-27.....	142	134	136	140	136	137	138	135	130	129	142	150	138	137
1927-28.....	141	142	142	145	141	144	151	156	169	196	196	179	149	159

* Sources as for Table II.

TABLE IV.—WEIGHTED AVERAGE PRICES OF REPORTED CASH SALES OF NO. 2 HARD WINTER WHEAT AT KANSAS CITY, MONTHLY, JULY 1899 TO JUNE 1914 AND JULY 1921 TO JUNE 1928*
(Cents per bushel)

Crop year July-June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Annual averages	
													(A)	(B)
1899-1900....	66	65	65	65	63	64	63	64	64	64	62	66	65	64
1900-01.....	69	66	67	68	67	66	68	68	69	70	70	67	68	68
1901-02.....	63	67	66	66	69	75	79	75	72	72	74	70	68	71
1902-03.....	70	66	67	67	67	67	67	68	68	68	69	73	68	68
1903-04.....	70	73	73	73	72	71	75	87	89	89	92	89	77	79
1904-05.....	87	94	103	106	105	105	107	109	104	93	101	100	97	101
1905-06.....	84	80	78	80	81	81	81	78	76	79	80	78	80	80
1906-07.....	71	68	66	69	69	70	71	72	71	73	90	91	72	73
1907-08.....	87	86	93	100	96	97	100	95	98	97	100	97	93	96
1908-09.....	97	95	98	99	102	103	106	110	115	130	138	137	99	111
1909-10.....	114	102	102	106	104	110	111	111	110	108	107	108	107	108
1910-11.....	104	100	99	95	91	93	95	90	88	88	90	88	98	93
1911-12.....	87	93	95	104	100	100	105	103	105	109	111	109	97	102
1912-13.....	92	89	88	88	83	84	87	86	86	88	87	88	88	87
1913-14.....	82	83	87	84	83	84	85	86	88	87	90	85	84	85
1921-22.....	118	115	122	110	109	109	113	129	134	135	134	117	120	120
1922-23.....	113	104	104	113	117	117	114	115	116	120	116	104	113	113
1923-24.....	96	101	109	112	109	109	113	111	109	104	106	108	105	107
1924-25.....	120	119	120	137	143	162	182	181	171	151	163	160	135	151
1925-26.....	154	164	158	158	163	172	178	171	161	159	155	153	163	162
1926-27.....	137	131	132	139	137	138	137	135	133	131	142	144	135	136
1927-28.....	136	135	131	128	131	132	133	133	138	152	160	147	135	138

* Sources as for Table II.

TABLE V.—AVERAGES OF DAILY CASH CLOSING PRICES OF NO. 1 MANITOBA NORTHERN WHEAT AT WINNIPEG, MONTHLY, JULY 1909 TO JUNE 1914 AND JULY 1921 TO JUNE 1928*

(Cents per bushel)

Crop year July-June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
1909-10	131	119	100	97	97	98	103	103	104	103	98	93	104
1910-11	108	107	103	98	92	90	94	93	90	90	95	97	96
1911-12	95	101	101	100	99	95	95	97	98	101	104	106	99
1912-13	107	106	100	91	85	80	82	84	85	89	93	96	92
1913-14	97	95	89	81	83	84	85	88	90	90	93	94	89
1921-22	164	156	133	104	102	105	108	131	137	140	144	131	130
1922-23	135	117	99	101	110	108	107	110	110	119	115	112	112
1923-24	106	111	104	96	96	91	94	97	95	96	103	112	100
1924-25	135	142	142	160	164	173	196	197	176	156	182	171	166
1925-26	162	167	138	127	142	157	156	155	148	157	154	153	151
1926-27	159	151	144	143	141	134	136	140	143	145	155	161	146
1927-28	162	160	145	144	145	140	143	142	148	157	157	143	149

* Data from *Agriculture Yearbook*, 1927, p. 759, supplemented by additional data from the *Grain Trade News* (Winnipeg).

TABLE VI.—AVERAGE SPOT PRICES OF GOOD AVERAGE QUALITY RED WHEAT AT LIVERPOOL, MONTHLY, JULY 1899 TO JUNE 1914 AND JULY 1921 TO JUNE 1928*

(Cents per bushel)

Crop year July-June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
1899-1900	82	80	84	86	83	81	86	87	86	93	95	91	86
1900-01	91	86	91	86	87	86	89	87	87	86	86	84	87
1901-02	82	83	81	83	84	90	90	89	89	90	92	89	87
1902-03	91	91	86	85	85	88	90	91	90	89	90	91	89
1903-04	89	91	90	89	88	88	89	90	95	95	92	89	90
1904-05	89	90	...	...	...	...	...	...	101	99	97	..	95 ^a
1905-06 .....	...	...	94	96	97	96	103	103	104	99	95	95	98 ^b
1906-07	96	92	91	91	90	90	89	92	92	92	98	104	93
1907-08	104	105	111	114	112	113	116	107	104	111	109	108	110
1908-09	109	108	111	112	115	116	116	121	123	132	138	134	120
1909-10	137	130	110	115	121	121	124	123	121	118	110	104	120
1910-11	108	115	112	108	104	104	107	107	...	...	103	104	107 ^b
1911-12	104	104	107	108	105	107	111	115	120	123	123	122	112
1912-13	124	115	116	116	111	109	111	112	112	113	112	111	114
1913-14	110	107	104	102	104	105	102	104	107	107	111	109	106
1921-22	171°	159°	156°	131°	126°	137°	144	166	162	158	160	143	151
1922-23	152	137	132	148	148	148	148	143	140	145	149	138	144
1923-24	138	132	125	126	126	125	126	...	128	123	125	126	127 ^d
1924-25	143	160	163	176	179	189	210	214	198	175	184	182	181
1925-26	176	188	180	166	171	189	183	181	164	167	173	172	176
1926-27	174	171	166	173	179	179	169°	169 ^f	164 ^f	158 ^f	168 ^f	180°	171
1927-28	176°	166 ^f	157°	155°	155°	156°	156 ^f	154 ^f	155 ^f	...	...	...	159°

* Data from *Agriculture Yearbook*, 1922, p. 601, and 1927, p. 759. Prices for 1928 computed by Food Research Institute from Broomhall's *Corn Trade News*. Dots (...) indicate that data are not available.

^a Five months' average.

^b Ten months' average.

^c No. 2 hard winter when available, otherwise No. 2 red winter.

^d Eleven months' average.

^e No. 2 hard winter.

^f No. 2 red winter.

^g Nine months' average.

VARIATIONS IN WHEAT PRICES

TABLE VII.—AVERAGE PRICES OF WHEAT IMPORTED INTO UNITED KINGDOM, MONTHLY, JULY 1899 TO JUNE 1914 AND JULY 1921 TO JUNE 1928*

(Cents per bushel)

Crop year July-June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Annual averages	
													(A)	(B)
1899-1900....	87.3	84.7	86.4	87.8	87.1	86.2	86.7	86.5	86.2	87.0	85.8	87.1	86.6	86.6
1900-01.....	90.9	88.9	90.7	91.6	90.7	89.6	89.3	89.5	89.1	87.8	88.5	87.9	89.6	89.5
1901-02.....	85.3	85.1	83.1	83.0	83.8	85.3	88.4	87.2	88.2	84.5	90.3	88.8	86.2	86.1
1902-03.....	88.7	86.6	86.3	85.1	85.1	87.0	87.4	90.0	90.5	87.5	89.5	88.5	87.6	87.7
1903-04.....	88.2	87.7	88.4	88.6	88.6	87.6	88.5	90.0	92.4	90.4	89.6	89.2	89.1	89.1
1904-05.....	88.1	90.7	93.1	93.2	93.9	94.9	94.2	94.0	95.2	93.5	93.9	94.9	93.3	93.3
1905-06.....	92.9	92.9	92.8	94.3	96.3	96.7	97.1	96.6	94.2	93.0	93.4	92.1	94.0	94.4
1906-07.....	91.4	90.5	88.9	88.3	88.2	88.0	89.0	90.4	89.9	89.5	92.6	97.4	90.8	90.3
1907-08.....	99.5	101.2	106.1	114.8	116.5	116.1	116.6	112.1	107.3	105.4	107.8	104.5	108.3	109.0
1908-09.....	107.1	107.4	110.7	112.4	111.9	113.6	112.8	112.7	115.9	119.7	127.0	127.8	115.3	114.9
1909-10.....	130.3	126.4	121.2	115.0	116.5	116.8	117.6	118.7	118.1	116.7	112.0	103.8	117.7	117.8
1910-11.....	104.1	107.1	108.0	107.1	103.4	102.0	102.9	103.4	103.2	101.2	101.0	100.8	103.7	103.7
1911-12.....	99.5	101.8	105.0	108.1	108.5	106.8	107.8	109.8	112.0	113.1	111.3	109.5	107.6	107.8
1912-13.....	109.2	109.6	108.5	112.9	112.3	108.8	110.2	109.3	110.6	110.1	109.7	109.9	110.1	110.1
1913-14.....	109.3	107.8	107.1	104.9	102.8	101.9	102.7	103.2	104.6	104.6	106.2	106.5	105.4	105.1
1921-22.....	174.2	165.5	164.0	160.7	143.0	142.8	135.9	139.2	149.3	154.7	156.8	154.1	154.5	153.4
1922-23.....	149.2	145.4	132.9	130.9	135.8	141.6	142.6	140.4	138.0	136.9	140.2	138.5	139.7	139.4
1923-24.....	132.2	126.6	121.2	119.8	118.1	118.1	115.6	121.2	122.5	123.0	121.1	121.4	122.1	121.7
1924-25.....	127.4	143.2	149.4	161.9	174.8	182.3	192.8	203.2	203.1	193.9	187.6	188.1	171.4	175.6
1925-26.....	178.0	176.3	176.5	160.5	157.4	164.5	174.9	178.6	171.5	168.7	169.1	170.3	170.4	170.5
1926-27.....	170.8	167.9	165.0	163.4	170.3	167.5	165.5	161.5	160.1	158.1	160.5	162.8	164.3	164.4
1927-28.....	163.3	163.6	162.7	157.3	153.9	154.6	149.8	151.0	147.4	153.9	155.9	154.5	155.7	155.7

* Data from *Accounts Relating to Trade and Navigation of the United Kingdom*. Pre-war prices converted to U.S. dollars at par; post-war prices converted at monthly average exchange rates.

TABLE VIII.—DEVIATIONS OF MONTHLY WEIGHTED AVERAGE PRICES OF REPORTED CASH SALES OF No. 1
NORTHERN SPRING WHEAT AT MINNEAPOLIS FROM AVERAGE PRICE OF PREVIOUS
MONTH, PRE-WAR AND POST-WAR*

(Cents per bushel)

Crop year July-June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
1900-01	+ 7	-- 4	+ 2	0	-- 2	-- 1	+ 2	-- 1	0	-- 2	+ 1	-- 4	2.2
1901-02	-- 4	+ 4	-- 1	-- 6	+ 8	+ 4	+ 2	-- 2	-- 2	+ 1	+ 2	0	3.0
1902-03	+ 3	-- 6	-- 5	+ 3	+ 2	+ 1	+ 3	+ 1	-- 1	0	+ 2	+ 6	2.8
1903-04	+ 2	+ 7	-- 8	-- 3	-- 2	+ 2	+ 6	+ 9	0	-- 4	+ 1	0	3.7
1904-05	+ 3	+17	+ 3	-- 2	-- 8	+ 2	+ 5	-- 1	-- 2	-- 9	+11	-- 3	5.5
1905-06	-- 2	--10	--17	+ 5	-- 2	+ 1	-- 2	-- 2	-- 4	+ 2	+ 4	+ 1	4.3
1906-07	-- 5	-- 4	-- 1	+ 2	+ 4	0	0	+ 2	-- 2	+ 4	+12	+ 5	3.4
Average....	3.7	7.4	5.3	3.0	4.0	1.6	2.9	2.6	1.6	3.1	4.7	2.7	3.6
1907-08	+ 1	-- 2	+ 8	+ 4	-- 9	+ 4	+ 3	-- 4	+ 1	-- 4	+ 6	-- 1	3.9
1908-09	+ 6	-- 2	-- 9	+ 1	+ 2	+ 4	-- 1	+ 4	+ 2	+ 9	+ 7	+ 3	4.2
1909-10	-- 5	--23	-- 2	0	+ 1	+ 7	+ 2	0	+ 1	-- 4	-- 1	-- 1	3.9
1910-11	+12	-- 8	-- 4	-- 1	-- 4	-- 1	+ 3	-- 4	-- 4	-- 2	+ 3	-- 2	4.0
1911-12	+ 2	+ 6	+ 4	+ 1	-- 5	-- 3	+ 4	0	+ 2	+ 2	+ 6	-- 3	3.2
1912-13	-- 4	--11	-- 9	+ 1	-- 6	-- 2	+ 7	-- 2	-- 2	+ 3	+ 3	+ 1	4.2
1913-14	-- 1	-- 3	-- 1	-- 3	+ 1	+ 1	+ 1	+ 6	-- 1	-- 1	+ 3	-- 2	2.0
Average....	4.4	7.9	5.3	1.6	4.0	3.1	3.0	2.9	1.9	3.6	4.1	1.9	3.6
1921-22	-- 2	--19	+ 3	--17	-- 9	+ 6	+ 3	+17	0	+ 7	+ 3	--12	8.2
1922-23	0	--38	-- 1	+ 5	+ 8	+ 2	-- 2	+ 3	-- 2	+ 6	-- 2	--11	6.7
1923-24	-- 5	+ 6	+ 3	-- 1	-- 6	+ 2	+ 3	+ 2	0	0	+ 1	+ 3	2.7
1924-25	+12	-- 6	-- 1	+16	+ 2	+18	+23	-- 2	--16	--21	+17	-- 3	11.4
1925-26	-- 5	+ 5	--14	-- 1	+ 6	+14	+ 4	-- 6	-- 6	+ 3	-- 2	+ 1	5.6
1926-27	+ 9	--23	-- 6	+ 6	-- 3	0	-- 3	-- 1	-- 3	-- 1	+ 9	+ 2	4.7
1927-28	-- 2	-- 4	-- 9	-- 5	+ 1	+ 2	+ 3	-- 1	+ 5	+14	+ 4	-- 9	4.9
Average....	5.0	14.4	5.3	7.3	5.0	6.3	5.9	4.6	4.6	7.4	5.4	5.9	6.3

* Based on data in Table II. The averages for the crop years and for the seven-year periods are computed without regard to the plus and minus signs.

TABLE IX.—DEVIATIONS OF MONTHLY WEIGHTED AVERAGE PRICES OF REPORTED CASH SALES OF No. 2 RED WINTER WHEAT AT ST. LOUIS FROM AVERAGE PRICE OF PREVIOUS MONTH, PRE-WAR AND POST-WAR*
(Cents per bushel)

Crop year July-June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
1900-01	- 2	- 2	+ 3	- 2	- 1	- 1	+ 2	0	+ 1	- 1	+ 1	- 6	1.8
1901-02	- 3	+ 5	0	+ 1	+ 2	+10	+ 5	- 3	- 4	- 2	+ 1	- 3	3.3
1902-03	- 7	- 5	+ 1	+ 3	- 1	+ 3	+ 3	+ 1	- 3	- 1	+ 3	+ 4	2.9
1903-04	+ 1	+ 1	+ 4	+ 2	0	+ 5	+ 1	+11	+ 1	+ 1	+ 2	- 1	2.5
1904-05	-10	+ 4	+14	+ 3	- 3	0	+ 3	0	- 3	- 6	- 1	- 3	4.2
1905-06	-16	- 4	+ 1	+ 6	0	+ 1	+ 1	- 2	- 1	+ 4	- 1	- 6	3.6
1906-07	-13	- 5	+ 2	+ 4	- 1	+ 1	+ 1	+ 1	- 1	+ 1	+11	+ 5	3.8
Average....	7.4	3.7	3.6	3.0	1.1	3.0	2.3	2.6	2.0	2.3	2.9	4.0	3.2
1907-08	- 5	- 2	+ 8	+ 8	- 7	+ 4	+ 3	- 1	0	- 3	+ 3	- 6	4.2
1908-09	- 4	+ 3	+ 7	+ 1	+ 4	+ 1	+ 3	+13	+ 6	+ 6	+ 3	+18	5.8
1909-10	-44	- 1	+ 2	+ 9	- 1	+ 6	+ 2	- 3	- 4	-11	+ 4	-14	8.4
1910-11	+ 5	- 5	0	- 2	- 4	+ 2	+ 5	- 7	- 3	- 3	+ 4	- 6	3.8
1911-12	- 4	+ 4	+ 6	+ 6	- 4	+ 1	+ 5	- 1	+ 3	+ 9	+ 8	-10	5.1
1912-13	- 8	+ 1	- 1	+ 6	- 5	+ 3	+ 4	- 2	- 1	+ 1	- 5	- 5	3.5
1913-14	-14	+ 3	+ 6	- 1	+ 1	+ 1	+ 1	- 1	0	- 1	+ 2	-12	3.6
Average....	12.0	2.7	4.3	4.7	3.7	2.6	3.3	4.0	2.4	4.9	4.1	10.1	4.9
1921-22	-27	0	+13	-10	- 6	+ 1	+ 1	+16	+ 4	- 1	- 3	-20	8.5
1922-23	- 6	- 3	+ 5	+ 9	+ 6	+ 7	+ 1	+ 2	- 3	+ 3	- 6	-10	5.1
1923-24	-26	+ 2	+10	+ 7	- 4	+ 2	+ 2	+ 2	- 4	- 1	- 1	+ 4	5.4
1924-25	+19	+ 3	+ 2	+16	+ 7	+16	+31	- 8	-16	- 9	+ 9	+ 3	11.6
1925-26	-30	+13	- 1	- 1	+ 1	+13	+10	- 9	-15	+ 1	- 9	-15	9.8
1926-27	- 5	- 8	+ 2	+ 4	- 4	+ 1	+ 1	- 3	- 5	- 1	+13	+ 8	4.6
1927-28	- 9	+ 1	0	+ 3	- 4	+ 3	+ 7	+ 5	+13	+27	0	-17	7.4
Average....	17.4	4.3	4.7	7.1	4.6	6.1	7.6	6.4	8.6	6.1	5.9	11.0	7.5

* Based on data in Table III. Averages computed without regard to plus and minus signs.

TABLE X.—DEVIATIONS OF MONTHLY WEIGHTED AVERAGE PRICES OF REPORTED CASH SALES OF NO. 2 HARD WINTER WHEAT AT KANSAS CITY FROM AVERAGE PRICE OF PREVIOUS MONTH, PRE-WAR AND POST-WAR*

(Cents per bushel)

Crop year July-June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
1900-01	+ 3	- 3	+ 1	+ 1	- 1	- 1	+ 2	0	+ 1	+ 1	0	- 3	1.4
1901-02	- 4	+ 4	- 1	0	+ 3	+ 6	+ 4	- 4	- 3	0	+ 2	- 4	2.9
1902-03	0	- 4	+ 1	0	0	0	0	+ 1	0	0	+ 1	+ 4	0.9
1903-04	- 3	+ 3	0	0	- 1	- 1	+ 4	+12	+ 2	0	+ 3	- 3	2.7
1904-05	- 2	+ 7	+ 9	+ 3	- 1	0	+ 2	+ 2	- 5	-11	+ 8	- 1	4.2
1905-06	-16	- 4	- 2	+ 2	+ 1	0	0	- 3	- 2	+ 3	+ 1	- 2	3.0
1906-07	- 7	- 3	- 2	+ 3	0	+ 1	+ 1	+ 1	- 1	+ 2	+17	+ 1	3.2
Average....	5.0	4.0	2.3	1.3	1.0	1.3	1.9	3.3	2.0	2.4	4.6	2.6	2.6
1907-08	- 4	- 1	+ 7	+ 7	- 4	+ 1	+ 3	- 5	+ 3	- 1	+ 3	- 3	3.5
1908-09	0	- 2	+ 3	+ 1	+ 3	+ 1	+ 3	+ 4	+ 5	+15	+ 8	- 1	3.8
1909-10	-23	-12	0	+ 4	- 2	+ 6	+ 1	0	- 1	- 2	- 1	+ 1	4.4
1910-11	- 4	- 4	- 1	- 4	- 4	+ 2	+ 2	- 5	- 2	0	+ 2	- 2	2.7
1911-12	- 1	+ 6	+ 2	+ 9	- 4	0	+ 5	- 2	+ 2	+ 4	+ 2	- 2	3.2
1912-13	-17	- 3	- 1	0	- 5	+ 1	+ 3	- 1	0	+ 2	- 1	+ 1	2.9
1913-14	- 6	+ 1	+ 4	- 3	- 1	+ 1	+ 1	+ 1	+ 2	- 1	+ 3	- 5	2.4
Average....	7.9	4.1	2.6	4.0	3.3	1.7	2.6	2.6	2.1	3.6	2.9	2.1	3.3
1921-22	-20	- 3	+ 7	-12	- 1	0	+ 4	+16	+ 5	+ 1	- 1	-17	7.2
1922-23	- 4	- 9	0	+ 9	+ 4	0	- 3	+ 1	+ 1	+ 4	- 4	-12	4.2
1923-24	- 8	+ 5	+ 8	+ 3	- 3	0	+ 4	- 2	- 2	- 5	+ 2	+ 2	3.7
1924-25	+12	- 1	+ 1	+17	+ 6	+19	+20	- 1	-10	-20	+12	- 3	10.2
1925-26	- 6	+10	- 6	0	+ 5	+ 9	+ 6	- 7	-10	- 2	- 4	- 2	5.6
1926-27	-16	- 6	+ 1	+ 7	- 2	+ 1	- 1	- 2	- 2	- 2	+11	+ 2	4.4
1927-28	- 8	- 1	- 4	- 3	+ 3	+ 1	+ 1	0	+ 5	+14	+ 8	-13	5.1
Average....	10.6	5.0	3.9	7.3	3.4	4.3	5.6	4.1	5.0	6.9	6.0	7.3	5.8

* Based on data in Table IV. Averages computed without regard to plus and minus signs.

TABLE XI.—DEVIATIONS OF MONTHLY AVERAGE CLOSING PRICES OF NO. 1 MANITOBA NORTHERN WHEAT AT WINNIPEG FROM AVERAGE PRICE OF PREVIOUS MONTH, PRE-WAR AND POST-WAR*

(Cents per bushel)

Crop year July-June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
1909-10.....	....	-12	-19	- 3	0	+ 1	+ 5	0	+ 1	- 1	- 5	- 5	4.7 ^a
1910-11.....	+15	- 1	- 4	- 5	- 6	- 2	+ 4	- 1	- 3	0	+ 5	+ 2	4.0
1911-12.....	- 2	+ 6	0	- 1	- 1	- 4	0	+ 2	+ 1	+ 3	+ 3	+ 2	2.1
1912-13.....	+ 1	- 1	- 6	- 9	- 6	- 5	+ 2	+ 2	+ 1	+ 4	+ 4	+ 3	3.7
1913-14.....	+ 1	- 2	- 6	- 8	+ 2	+ 1	+ 1	+ 3	+ 2	0	+ 3	+ 1	2.5
Average....	4.8	4.4	7.0	5.2	3.0	2.6	2.4	1.6	1.6	1.6	4.0	2.6	3.4
1921-22.....	- 5	- 8	-23	-29	- 2	+ 3	+ 3	+23	+ 6	+ 3	+ 4	-13	10.2
1922-23.....	+ 4	-18	-18	+ 2	+ 9	- 2	- 1	+ 3	0	+ 9	- 4	- 3	6.1
1923-24.....	- 6	+ 5	- 7	- 8	0	- 5	+ 3	+ 3	- 2	+ 1	+ 7	+ 9	4.7
1924-25.....	+23	+ 7	0	+18	+ 4	+ 9	+23	+ 1	-21	-20	+26	-11	13.6
1925-26.....	- 9	+ 5	-29	-11	+15	+15	- 1	- 1	- 7	+ 9	- 3	- 1	8.8
1926-27.....	+ 6	- 8	- 7	- 1	- 2	- 7	+ 2	+ 4	+ 3	+ 2	+10	+ 6	4.8
1927-28.....	+ 1	- 2	-15	- 1	+ 1	- 5	+ 3	- 1	+ 6	+ 9	0	-14	4.8
Average....	7.7	7.6	14.1	10.0	4.7	6.6	5.1	5.1	6.4	7.6	7.7	8.1	7.6

* Based on data in Table V. Averages computed without regard to plus and minus signs.

^a Eleven months' average.

VARIATIONS IN WHEAT PRICES

TABLE XII.—DEVIATIONS OF MONTHLY AVERAGE PRICES OF RED WHEAT AT LIVERPOOL FROM AVERAGE PRICE OF PREVIOUS MONTH, PRE-WAR AND POST-WAR*

(Cents per bushel)

Crop year July-June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
1900-01.....	0	-5	+5	-5	+1	-1	+3	-2	0	-1	0	-2	2.1
1901-02.....	-2	+1	-2	+2	+1	+6	0	-1	0	+1	+2	-3	1.8
1902-03.....	+2	0	-5	-1	0	+3	+2	+1	-1	-1	+1	+1	1.5
1903-04.....	-2	+2	-1	-1	-1	0	+1	+1	+5	0	-3	-3	1.7
1904-05.....	0	+1	....	....	....	....	....	....	....	-2	-2	....	1.2 ^a
1905-06.....	....	....	....	+2	+1	-1	+7	0	+1	-5	-4	0	2.3 ^b
1906-07.....	+1	-4	-1	0	-1	0	-1	+3	0	0	+6	+6	1.9
Average....	1.2	2.2	2.8	1.8	0.8	1.8	2.3	1.3	1.2	1.4	2.6	2.5	1.8
1907-08.....	0	+1	+6	+3	-2	+1	+3	-9	-3	+7	-2	-1	3.2
1908-09.....	+1	-1	+3	+1	+3	+1	0	+5	+2	+9	+6	-4	3.0
1909-10.....	+3	-7	-20	+5	+6	0	+3	-1	-2	-3	-8	-6	5.3
1910-11.....	+4	+7	-3	-4	-4	0	+3	0	....	....	....	+1	2.9 ^b
1911-12.....	0	0	+3	+1	-3	+2	+4	+4	+5	+3	0	-1	2.2
1912-13.....	+2	-9	+1	0	-5	-2	+2	+1	0	+1	-1	-1	2.1
1913-14.....	-1	-3	-3	-2	+2	+1	-3	+2	+3	0	+4	-2	2.2
Average....	1.6	4.0	5.6	2.3	3.6	1.0	2.6	3.1	2.5	3.8	3.5	2.3	3.0
1921-22.....	-25	-12	-3	-25	-5	+11	+7	+22	-4	-4	+2	-17	11.4
1922-23.....	+9	-15	-5	+16	0	0	0	-5	-3	+5	+4	-11	6.1
1923-24.....	0	-6	-7	+1	0	-1	+1	....	....	-5	+2	+1	2.4 ^c
1924-25.....	+17	+17	+3	+13	+3	+10	+21	+4	-16	-23	+9	-2	11.5
1925-26.....	-6	+12	-8	-14	+5	+18	-6	-2	-17	+3	+6	-1	8.2
1926-27.....	+2	-3	-5	+7	+6	0	-10	0	-5	-6	+10	+12	5.5
1927-28.....	-4	-10	-9	-2	0	+1	0	-2	+1	....	....	....	3.2 ^b
Average....	9.0	10.7	5.7	11.1	2.7	5.9	6.4	5.8	7.7	7.7	5.5	7.3	7.2

* Based on data in Table VI. Averages computed without regard to plus and minus signs.

^a Four months' average.^c Ten months' average.^b Nine months' average.

TABLE XIII.—DEVIATIONS OF MONTHLY AVERAGE PRICES OF WHEAT IMPORTS INTO UNITED KINGDOM FROM AVERAGE PRICE OF PREVIOUS MONTH, PRE-WAR AND POST-WAR*

(Cents per bushel)

Crop year July-June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
1900-01	+ 3.8	- 2.0	+ 1.8	+ 0.9	- 0.9	- 1.1	- 0.3	+ 0.2	- 0.4	- 1.3	+ 0.7	- 0.6	1.2
1901-02	- 2.6	- 0.2	- 2.0	- 0.1	+ 0.8	+ 1.5	+ 3.1	- 1.2	+ 1.0	- 3.7	+ 5.8	- 1.5	2.0
1902-03	- 0.1	- 2.1	- 0.3	- 1.2	0.0	+ 1.9	+ 0.4	+ 2.6	+ 0.5	- 3.0	+ 2.0	- 1.0	1.2
1903-04	- 0.3	- 0.5	+ 0.7	+ 0.2	0.0	- 1.0	+ 0.9	+ 1.5	+ 2.4	- 2.0	- 0.8	- 0.4	0.8
1904-05	- 1.1	+ 2.6	+ 2.4	+ 0.1	+ 0.7	+ 1.0	- 0.7	- 0.2	+ 1.2	- 1.7	+ 0.4	+ 1.0	1.1
1905-06	- 2.0	0.0	- 0.1	+ 1.5	+ 2.0	+ 0.4	+ 0.4	- 0.5	- 2.4	- 1.2	+ 0.4	- 1.3	1.0
1906-07	- 0.7	- 0.9	- 1.6	- 0.6	- 0.1	- 0.2	+ 1.0	+ 1.4	- 0.5	- 0.4	+ 3.1	+ 4.8	1.3
Average....	1.5	1.2	1.1	0.6	0.6	1.0	1.0	1.1	1.2	1.9	1.9	1.5	1.2
1907-08	+ 2.1	+ 1.7	+ 4.9	+ 8.7	+ 1.7	- 0.4	+ 0.5	- 4.5	- 4.8	- 1.9	+ 2.4	- 3.3	3.1
1908-09	+ 2.6	+ 0.3	+ 3.3	+ 1.7	- 0.5	+ 1.7	- 0.8	- 0.1	+ 3.2	+ 3.8	+ 7.3	+ 0.8	2.2
1909-10	+ 2.5	- 3.9	- 5.2	- 6.2	+ 1.5	+ 0.3	+ 0.8	+ 1.1	- 0.6	- 1.4	- 4.7	- 8.2	3.0
1910-11	+ 0.3	+ 3.0	+ 0.9	- 0.9	- 3.7	- 1.4	+ 0.9	+ 0.5	- 0.2	- 2.0	- 0.2	- 0.2	1.2
1911-12	- 1.3	+ 2.3	+ 3.2	+ 3.1	+ 0.4	- 1.7	+ 1.0	+ 2.0	+ 2.2	+ 1.1	- 1.8	- 1.8	1.8
1912-13	- 0.3	+ 0.4	- 1.1	+ 4.4	- 0.6	- 3.5	+ 1.4	- 0.9	+ 1.3	- 0.5	- 0.4	+ 0.2	1.3
1913-14	- 0.6	- 1.5	- 0.7	- 2.2	- 2.1	- 0.9	+ 0.8	+ 0.5	+ 1.4	0.0	+ 1.6	+ 0.3	1.0
Average....	1.4	1.9	2.8	3.9	1.5	1.4	0.9	1.4	1.9	1.5	2.6	2.1	1.9
1921-22	- 8.1	- 8.7	- 1.5	- 3.3	- 17.7	- 0.2	- 6.9	+ 3.3	+ 10.1	+ 5.4	+ 2.1	- 2.7	5.8
1922-23	- 4.9	- 3.8	- 12.5	- 2.0	+ 4.9	+ 5.8	+ 1.0	- 2.2	- 2.4	- 1.1	+ 3.3	- 1.7	3.8
1923-24	- 6.3	- 5.6	- 5.4	- 1.4	- 1.7	0.0	- 2.5	+ 5.6	+ 1.3	+ 0.5	- 1.9	+ 0.3	2.7
1924-25	+ 6.0	+ 15.8	+ 6.2	+ 12.5	+ 12.9	+ 7.5	+ 10.5	+ 10.4	- 0.1	- 9.2	- 6.3	+ 0.5	8.2
1925-26	- 10.1	- 1.7	+ 0.2	- 16.0	- 3.1	+ 7.1	+ 10.4	+ 3.7	- 7.1	- 2.8	+ 0.4	+ 1.2	5.3
1926-27	+ 0.5	- 2.9	- 2.9	- 1.6	+ 6.9	- 2.8	- 2.0	- 4.0	- 1.4	- 2.0	+ 2.4	+ 2.3	2.6
1927-28	+ 0.5	+ 0.3	- 0.9	- 5.4	- 3.4	+ 0.7	- 4.8	+ 1.2	- 3.6	+ 6.5	+ 2.0	- 1.4	2.6
Average....	5.2	5.5	4.2	6.0	7.2	3.4	5.4	4.3	3.7	3.9	2.6	1.4	4.4

* Based on data in Table VII. Averages computed without regard to plus and minus signs.

TABLE XIV.—DEVIATIONS OF ADJUSTED ANNUAL AVERAGE PRICES FROM CORRESPONDING PRICES OF PREVIOUS YEAR, PRE-WAR AND POST-WAR*

(Cents per bushel)

Crop year July-June	No. 1 North- ern Spring— Minneapolis		No. 2 Red Winter— St. Louis		No. 2 Hard Winter— Kansas City		Wheat exports from U.S. to Europe	No. 1 Manitoba Northern— Winnipeg	Average quality, red, spot— Liverpool	Wheat Imports into United Kingdom	
	(A)	(B)	(A)	(B)	(A)	(B)	(A)	(B)	(B)	(A)	(B)
1900-01.....	+10	+10	+ 4	+ 4	+ 5	+ 6	+ 3	..	+ 2	+ 5	+ 4
1901-02.....	- 7	- 7	- 4	+ 3	- 2	+ 1	- 3	..	- 3	- 8	- 7
1902-03.....	0	0	- 8	-13	- 5	- 8	- 2	..	- 4	- 5	- 5
1903-04.....	+18	+18	+19	+29	+12	+15	+ 7	..	+ 3	+ 4	+ 4
1904-05.....	+23	+23	+20	+17	+22	+24	+ 8	..	+ 4	+ 3	+ 3
1905-06.....	-29	-29	-17	-24	-21	-26	- 9	..	+ 3	0	+ 1
1906-07.....	- 9	- 9	-21	-19	-13	-12	- 7	..	-11	- 8	-10
Average...	13.7	13.7	13.3	15.6	11.4	13.1	5.6	..	4.3	4.7	4.9
1907-08.....	+26	+26	+22	+21	+23	+24	+23	..	+18	+18	+20
1908-09.....	+ 8	+ 7	+ 7	+19	+ 5	+15	0	..	+ 9	+ 6	+ 5
1909-10.....	-17	-13	- 1	- 9	- 2	-13	- 9	..	-11	- 8	- 8
1910-11.....	+ 3	0	- 7	-15	- 2	- 8	- 3	- 1	- 6	- 7	- 7
1911-12.....	+ 2	+ 2	- 6	+ 3	- 2	+ 8	0	+ 2	+ 5	+ 3	+ 4
1912-13.....	-25	-22	+ 7	+ 1	-13	-19	0	-11	- 3	- 2	- 3
1913-14.....	+ 2	0	-15	-13	- 3	- 1	- 1	- 2	- 7	- 4	- 4
Average...	11.9	10.0	9.3	11.6	7.1	12.6	5.1	4.0	8.4	6.9	7.3
1921-22.....	.. ^a	.. ^a	.. ^a	.. ^a	.. ^a	.. ^a	.. ^a	.. ^a	.. ^a	.. ^a	.. ^a
1922-23.....	-23	-24	-11	- 9	-11	-13	-15	-19	-14	-19	-18
1923-24.....	+ 1	0	- 7	- 8	- 3	- 1	- 6	- 5	- 8	- 9	- 9
1924-25.....	+23	+23	+32	+37	+17	+26	+29	+40	+33	+30	+32
1925-26.....	+ 2	+ 2	+ 6	- 1	+18	+ 7	- 2	-10	- 4	- 2	- 3
1926-27.....	- 4	- 4	-15	-17	-13	-11	- 2	+ 2	+ 3	+ 3	+ 2
1927-28.....	- 7	- 5	+ 7	+15	0	+ 1	- 4	+ 2	- 8	- 6	- 6
Average...	10.0	9.7	13.0	14.5	10.3	9.8	9.7	13.0	11.7	11.5	11.7

* Based on data in Table 10. The columns headed (A) represent deviations of adjusted weighted average annual prices; the columns headed (B) represent deviations of adjusted unweighted annual averages of monthly weighted average prices. Averages computed without regard to plus and minus signs.

^a Deviations of prices for the year 1921-22 from those for 1920-21 are omitted because of the deflation of prices in that year.

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