PRICE EFFECTS OF CANADIAN WHEAT MARKETING

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I. INTRODUCTION AND SUMMARY

The machinery of wheat marketing through the major trade channels in the Western world has reached a high degree of efficiency. The present stage of development of the marketing system has been attained through progress in technical efficiency, progress in organization, and progress in the performance of public functions connected with the marketing system. During recent years attention in several countries has focused on questions of public functions in relation to wheat production and marketing. In individual countries, action of various sorts has been taken. Currently in the United States the Administration is urging Congress to authorize an extensive system of government-financed grain storage, under the name of an "ever-normal granary," which would exert substantial influence upon the marketing and price-making processes. In Canada a Royal Commission, acting under broad "terms of reference," is making an extensive study of Canadian wheat marketing and is expected to make recommendations aimed to improve the determination of wheat prices.

Such considerations of public functions in relation to wheat marketing bring into prominence a perennial subject of controversy: the question of adequacy or inadequacy of prevailing systems of price determination. Dissatisfaction of producers with the prices offered by traders probably dates from about the earliest beginnings of trade. In recent times discussion of the question has been prolonged and heated, and has offered a pertinent example to support the generalization that the amount of discussion of a question tends to

vary inversely with the amount of factual information available for reaching a sound conclusion.

Among the charges laid against existing systems of price determination on an open market is the allegation that prices tend to be depressed unduly during the period when producers are selling most heavily. In countries such as the United States and Canada, where the price mechanism has taken the elaborate form in which its central feature is a futures market, the charge is that this market is not effective in absorbing, without undue price depression, the burden of hedging that arises in connection with the farmers' marketing. This is a question open to objective factual investigation, given certain requisite statistical data. For Canada there exists a unique body of statistics, from which it is possible to determine with considerable precision the price effects of variations in the daily rate of farm marketing of wheat.

The Canadian record is one peculiarly worthy of study. The wheat crop of the Canadian prairies is marketed with great rapidity. Three-fourths of a normal crop in the Dominion cannot find local markets, but must be moved into export channels. The harvest comes at the time when wheat supplies for the world as a whole are at their seasonal maximum. For markets to absorb heavy deliveries at this season is much more difficult than for them to absorb the heavy deliveries from Argentina—also notable for extraordinarily rapid marketing—since Argentine supplies reach import markets opportunely in a period that would otherwise be one of relative

seasonal scarcity. Furthermore, the export wheats of Canada possess special milling characteristics requiring, for their most effective utilization, that Canadian wheat be fed into consumption more or less uniformly throughout the year. These conditions subject the Canadian marketing system to an extreme strain. They afford a test that is perhaps not representative, but one that is at least peculiarly fitted to reveal weaknesses in the system.

In Canada, moreover, there have been important changes in conditions during the fifteen years for which the available data make possible a close study of the effectiveness of the marketing system in operation. The latter part of the period has been one of distinctly earlier and somewhat more rapid marketing than the earlier part. During part of the period the determination of prices was left to a substantially unfettered open market without attempts at control. During part of the period the most powerful co-operative wheat marketing organization in history was trying out, under favorable circumstances, its ideas for improving the functioning of the price system. Later, the co-operative organization having fallen into difficulties, largely through circumstances beyond its control, its selling agency operated even more ambitiously with the financial backing of the Dominion government, and later with the aid of restrictions placed on the market itself. Finally, there ensued a period of supervision by a Dominion government wheat board — or more properly, by two boards in succession, operating under quite different policies. The Canadian record is one of a series of boldly conceived experiments aimed at improving the operation of the price system. Here is an extraordinary opportunity to observe the behavior of the market under changing conditions of great interest.

The questions to which answers may be wished, in this connection, are many. By comparison, the points on which clear evidence is obtainable may seem few. Though its scope be thus narrowly restricted, the present study attempts to hold to the relatively firm ground of facts demonstrable from the statistics, or at least, of conclusions indicated with a high degree of statistical probability. By inference, the information thus developed throws light on other questions; but it is better that these be left out of the present discussion, lest confusion arise between those questions on which strong or conclusive statistical evidence has been presented and those to which answers may still be found only through inference or uncertain reasoning.

For the postwar years from 1921–22 there appears clearly to have been a tendency for prices of spot wheat in Canada to be at their lowest during two or three months after harvest and then to rise progressively, though somewhat irregularly, to a maximum shortly before the next harvest. Between the three months (October–December) for which prices averaged lowest over sixteen years and the three (June–August) for which they averaged highest, the price difference has been a little over 7 cents. If this difference be supposed representative of a general tendency for such a seasonal variation to recur year after year, there may arise the question whether such a range of variation is excessive. To this no answer is here attempted. Instead there are presented, to contribute perspective for judgments, certain comparable data on seasonal average prices of other wheats.

Toward one extreme stand prices of Australian wheat, with an average seasonal variation less than that of Canadian wheat and an average course very peculiarly related to the timing of the harvest. Toward another extreme stand prices of British domestic wheat, with an average seasonal variation greater than that of Canadian wheat despite the relatively moderate variation in rate of marketing of British wheat, and an average course suggesting that the system under which the wheat is marketed rather imperfectly meets the very modest requirements placed upon it.

Whether the broad seasonal tendency in prices of Canadian wheat has changed during sixteen years with the changing conditions one cannot hope to determine with any assurance. Even assuming existence of a constant underlying tendency over the sixteen years, it must be recognized that 16-year averages may fail to represent that tendency quite accurately. The averages may have been dis-

torted appreciably by chance occurrences. The principal price movements in most years arise from influences not closely related to the timing of marketing and the rate of marketing. These influences are many, and sometimes obscure in nature. It is impossible—at least with present knowledge—to distinguish year by year what portion of the total price movement was a consequence of marketing characteristics and what portion was a consequence of the numerous and powerful other influences bearing on prices. Some useful conclusions may be drawn, however, from a study of changes in the relations between prices of Canadian wheats and of other wheats. The timing and rate of marketing affect these price relations much as they affect the absolute price, while most of the general price influences have little effect on price relations. The price effects of marketing are therefore more clearly observable in certain price relations than in the level of prices.

Even price relations between Canadian and other wheats in the British market are subject to numerous influences. Outstanding among the influences, however, is the supply of Canadian and other hard wheats to be moved into export during the season as a whole. The price position of Canadian wheat relative to other wheats in the autumn is dependent on a market appraisal that looks forward through the season as a whole. Unforeseen developments may force a change in price relations during the course of the season; and sometimes the price relations may change because they failed adequately to reflect known facts; but we find no evidence of a general tendency toward relative under-pricing of Canadian wheat in the autumn, or of other systematic aberration in the price adjustment. There may be such a tendency, but if it is present it is too weak to be demonstrable from study of price relations of Canadian and other wheats in the British market.

Pursuing the inquiry further, we employ in the subsequent sections of the study a still more refined and searching method of analysis. From this there emerge evidences of price effects that seem legitimately attributable to variations in the rate of farm marketing. The effects are small—indeed, for the most part they are barely within the powers of this refined analysis to detect. Perhaps the results are significant chiefly as a demonstration that for most purposes the price effects of variations in the rate of marketing may be regarded as negligible. The principal effects among those noted seem only indirectly related to the rate of country marketing. The Winnipeg price tends to decline relative to Liverpool early in the marketing season under the pressure of adjustments necessary to permit a rapid export movement. The occurrence of such price adjustments is perhaps not an indication that the rapid country marketing leads to undue price depression and an excessive rate of export; but rather that the Winnipeg price tends to be somewhat too high at the beginning of the season, and to fall into an appropriate relation to Liverpool only as the requirements of the situation are clarified in the course of meeting them.

There are, nevertheless, certain small price effects that appear rather directly related to the rate of country marketing. They seem to reflect an influence of hedging pressure on the Winnipeg futures market. These effects averaged much larger during 1933 to 1936 than during earlier years, and seem to have been different in 1928 and in 1935 than in other years. Possible explanations of these apparent changes in the price effect of variations in rate of marketing suggest themselves. For the present, suggested explanations may be offered only tentatively, for to test their validity would require study of facts not publicly available. Some of the suggestions may merit further investigation.

II. GENERAL RELATIONS OF MARKETING TO PRICE

SEASONAL PRICE TENDENCIES

Wheat marketing is strongly seasonal in character; consequently the seasonal course of prices affords some indication of price effects that may be attributable to the rate of marketing. Of a normal Canadian wheat crop of about 400 million bushels, three-fourths is

exported; prices in foreign markets are therefore of prime importance for Canadian wheat. Only Canadian, Australian, and British domestic wheats have been quoted in the British market with such consistency since 1921 as to afford good price series for calculating the average seasonal course. Other wheats, though sometimes comprising individually a large fraction of British imports, have at other times been absent from the British market over long intervals.

The averages plotted in Chart 1 show two

CHART 1.—AVERAGE SEASONAL COURSE OF PRICES OF CANADIAN AND OTHER WHEATS IN BRITISH MARKETS*

(U.S. cents per bushel)
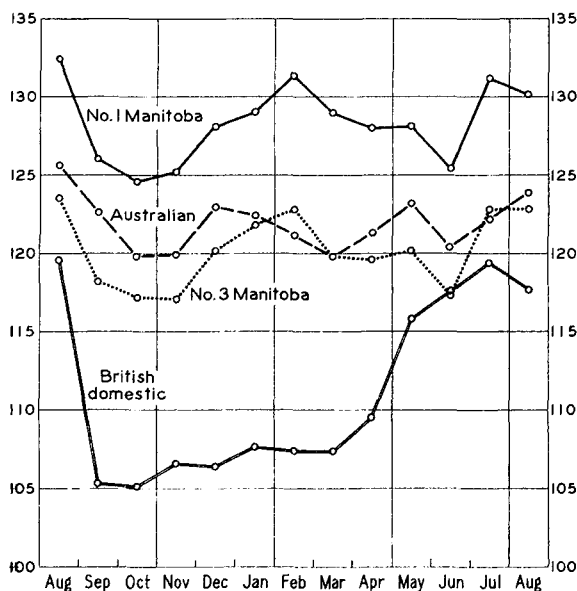
* Average monthly prices for sixteen years, 1921–22 to 1936–37, from Table I.

clearly marked peaks in the seasonal course of Canadian wheat prices. From a maximum in July or August these averages decline about 6 per cent to the low levels of October and November. On No. 3 Manitoba, the extreme decline in the 16-year averages was 6.4 cents per bushel, and on the higher-priced No. 1 Manitoba, the decline averaged 7.8 cents. In February a second price peak is reached by the averages—a little lower than that of August. For June, the averages show a temporary dip to about the low of the pre-

vious autumn; and for July, an advance to about the high of the season.[1]

Australian wheat prices in the British market averaged highest in August; declined somewhat less than the Canadian wheats during the autumn; and after advancing in December, declined again with appearance of new-crop Australian wheat on the market. The dating of this decline in the averages is affected by the fact that the price data are c.i.f. quotations on wheat afloat or for near shipment. The influence of availability of new-crop wheat tends to appear in the prices at about the time such wheat begins to be shipped from Australia. From March the price averages for Australian wheat advance, probably influenced by the advance in prices of British domestic wheat. Australian and

[1] Here and elsewhere in this study conclusions drawn from seasonal averages are so stated as to take account of the fact that such averages afford only a rough indication of the underlying tendencies they purport to measure. In using such averages as an indication of a seasonal tendency the implicit assumption is made that the underlying tendency remained the same throughout the period used for the averages. Granting temporarily the validity of that assumption, the averages may be expected to give only an approximate measure of the true tendency, since the averages are affected also by chance factors. Attempting to determine the seasonal tendency in wheat prices from a 16-year record may be compared with attempting to determine the normal difference in stature between men and women by averaging the statures of only 16 men and 16 women; or with attempting to determine the normal growth rate of boys from records for only 16 boys.

In point of fact, it is by no means certain that the same seasonal tendency has persisted in these price series through 16 years. The seasonal tendencies may have changed substantially during the period, either progressively or abruptly. Despite these possibilities, the 16-year averages probably afford indications of seasonal tendencies in the price series about as trustworthy as any that might be obtained. Accepted with appropriate reservations, they adequately serve the purposes for which they are here used.

Assuming constancy of the seasonal tendency to be measured, it may be argued on theoretical grounds that other statistical techniques would afford measures of the seasonal tendency somewhat more reliable than the simple averages here employed. The method preferred on theoretical grounds would differ according to the assumed characteristics of the statistical series to be dealt with. The conditions properly to be assumed are not known. Since the simple price averages yield results nearly as reliable as might be expected from another method chosen without precise knowledge of the requirements to be met, their advantages of ease of computation and ready interpretation throw the balance in their favor.

British wheats may be substituted for each other in the mill mix much more freely than either may be substituted for Canadian wheat or Canadian substituted for them. The price averages for Australian wheat, however, show a decline in June similar to that of Canadian wheat.

Prices of British domestic wheat show a much stronger seasonal variation than the imported wheats. From August to September the decline in the averages amounts to 12 per cent. The subsequent rise is slow until April and May. Broadly, it may be said that the seasonal tendency in British domestic prices is for maintenance of one level from September to March or April, while farmers are delivering wheat rather freely, and for maintenance of a considerably higher level in the later spring and summer months when farmers are busy with field work.

British wheat is marketed much more evenly through the year than is Canadian wheat.[1] The marketing system is simple, and elaborate provisions for commercial storage are not essential and have not been developed. Perhaps it is because a highly developed mar-

[1] An indication of the contrast in marketing practice between Canada and the British Isles is afforded by the following monthly percentages based on 7-year averages, 1921–22 to 1927–28, of reported farm marketings:

Month	Canada	Britain	Month	Canada	Britain
Aug.	1.3	3.1	Feb.	4.7	9.6
Sept.	17.8	9.6	March	4.5	10.6
Oct.	24.1	12.0	April	1.8	5.5
Nov.	21.8	11.9	May	1.7	7.1
Dec.	12.2	13.9	June	2.4	4.3
Jan.	6.5	10.4	July	1.2	2.0

If marketings were the same each month, 8.3 per cent of the total would be marketed monthly. The averages for British marketings reach a maximum of 1.7 times this rate, and a minimum .24 times this rate. The averages for Canadian marketings reach a maximum 2.9 times the general average rate, and a minimum .14 times that rate. In the month of maximum average British marketings, the rate is nearly 7 times that in the month of minimum average marketings. In the month of maximum average Canadian marketings, the rate is about 20 times that in the month of minimum average marketings.

After 1927–28 the pattern of Canadian marketing changed notably, becoming still more uneven: rapid marketing started more than two weeks earlier on the average, proceeded more rapidly, and smaller percentages were left for marketing in the spring months (Holbrook Working, "The Timing of Wheat Marketing in Western Canada," WHEAT STUDIES, October 1936, XIII, 33–64).

keting system has been unnecessary for British domestic wheat that the rather moderate seasonal variations in rate of marketing produce, apparently, such large seasonal changes in price of this wheat.

Prices of No. 1 Manitoba Northern wheat at Winnipeg show a stronger seasonal variation than on the British market because shipment costs, representing the main element in the price differences between the two markets, have a seasonal tendency roughly opposite to that of the Winnipeg price. The 16-year averages of monthly prices at Winnipeg are shown in Chart 2, together with averages of

CHART 2.—AVERAGE SEASONAL COURSE OF LIVERPOOL AND WINNIPEG PRICES OF NO. 1 MANITOBA WHEAT*

(U.S. cents per bushel)
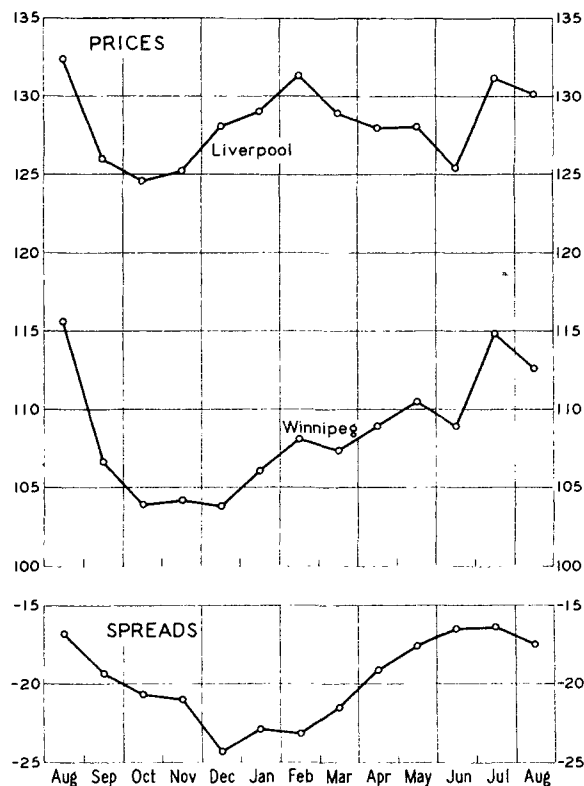
* Average monthly prices and price spread for sixteen years, 1921–22 to 1936–37, from Table I.

the discount of the Winnipeg price under the British price of the same grade of wheat.

Neglecting the minor fluctuations, which are of doubtful significance, the average seasonal course of the Winnipeg price may be

described very simply. From a low prevailing over the three months, October–December, the averages rise fairly steadily to a peak in July. Then ensues a drop of about 13 cents in September and October, as marketing of the new crop begins. With allowance for fluctuations in the curve which are probably largely accidental and do not indicate true general tendencies, the rate of advance from the autumn low seems well reflected in the rise of 6.6 cents from an average of 103.9 cents in October to an average of 110.5 cents in May. This is an advance at the average rate of .94 cents a month.

The seasonal variation in average spreads of Winnipeg prices of No. 1 Manitoba Northern under the British prices (Chart 2, lower section) doubtless reflects chiefly seasonal variation in shipment costs.[1] Thus one may view the seasonal course of Winnipeg prices as a consequence of the seasonal course of prices in the British market, modified by the seasonal variation in shipment costs; or one may view the seasonal course of prices of Canadian wheat in the British market as a consequence of the seasonal course of prices in Canada, modified by the seasonal variation in shipment costs.

Doubtless seasonal influences operating more particularly in the British market tend to affect the course of prices of Canadian wheat there, but on the whole it seems more reasonable to suppose that it is chiefly in the Canadian market that the seasonal course of prices of Canadian wheat is initially determined. The essentially simple and logical pattern of the seasonal averages of Winnipeg prices supports this view. The pattern of the seasonal averages of British prices of Canadian wheat, on the other hand, is difficult to explain except on the supposition that it represents a combination of the two sets of seasonal tendencies appearing respectively in the Winnipeg prices and in shipment costs.

The seasonal tendencies in prices of Australian wheat (Chart 3) afford an interesting contrast with those of Canadian wheat. Prices

[1] The relations involved are discussed in detail in Katharine Snodgrass, "Price Spreads and Shipment Costs in the Wheat Export Trade of Canada," WHEAT STUDIES, March 1926, II, 177–202.

at Melbourne averaged lowest in March, about three months after harvest. From March to August the price averages rise at about the same rate that Winnipeg prices rise from their seasonal low; but after August, which is late winter in Australia, the Melbourne prices decline. Apparently Australian wheat holdings through their winter season have tended

CHART 3.—AVERAGE SEASONAL COURSE OF LIVERPOOL AND MELBOURNE PRICES OF AUSTRALIAN WHEAT*

(U.S. cents per bushel)
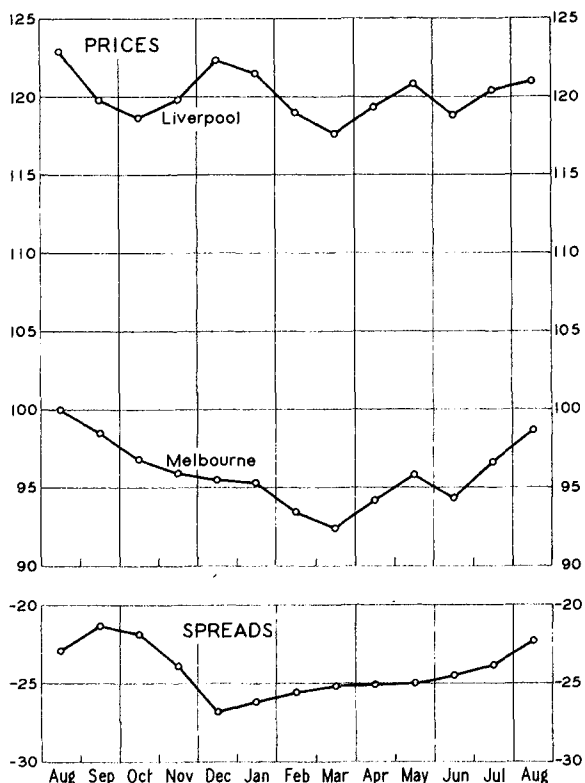
*Monthly average prices and price spread for fifteen years, 1922–23 to 1936–37, from Table I.

to be large enough that on the average holders have obtained prices only slightly higher near the end of the season than might have been obtained near the beginning of the season, in December or January.

The seasonal course of Australian prices must be interpreted, however, in relation to the general international wheat situation. Superficially, it seems logical that the price of cash wheat in Australia should tend to advance more or less progressively during the

season, at a rate covering costs of storage, and reach a maximum in November or early December, just before harvest. But to maintain such a seasonal trend in an exporting country of the Southern Hemisphere, it is necessary either that wheat from that country be sold in import markets after August at prices abnormally high in relation to new-crop wheat from Northern Hemisphere countries, or that exportation for the season be completed by about August or earlier. Australian wheat competes so directly with similar wheats from Northern Hemisphere countries that its price must either follow their post-harvest decline after August or find no export outlet of consequence in the Northern Hemisphere. Faced with this situation, Australia tends to ship the greater part of her exportable surplus before August, but tends to retain some surplus for export after August, which must meet the prices of new-crop wheat from the Northern Hemisphere.

SUPPLY AND DEMAND INFLUENCES AFFECTING PRICE RELATIONS

The seasonal changes of price relations considered above are perhaps indicative of tendencies which have persisted without much alteration during the sixteen years from 1921–22 to 1936–37. The relative price position of Canadian wheat, however, has in individual years differed widely from that shown in the 16 - year averages, under the influence of changing conditions of supply and demand. In general, Canadian wheats tend to be relatively high in price when supplies of Canadian wheat for export are small in relation to total world exports. Conversely, Canadian wheats tend to be relatively low in price when supplies of Canadian wheat are large in relation to total world exports. The relative abundance or scarcity of hard wheats from other countries also affects the price of Canadian wheat in its relation to the softer wheats.

The sixteen years since 1921 have witnessed a notable and progressive increase in the demand for hard wheats. The proportion of hard wheats which would be regarded as optimal in total imports of net-importing countries has perhaps not increased greatly; but in recent years importers have been willing to pay higher premiums than formerly for hard wheats when the supplies of such wheat have been relatively small. It might be said that the demand for hard wheats has increased in intensity through perhaps not in quantity.

With changes from year to year in relative abundance of Canadian wheat, there is some tendency for the price of No. 1 Manitoba to stand high relative to the price of No. 3 when both are high relative to prices of other wheats. In this respect, the conditions that favor premiums on Canadian wheat favor especially the highest qualities of Canadian wheat. The tendency for premiums on Canadian wheat to increase more or less progressively during the past sixteen years seems not to have been accompanied by an equivalent tendency for No. 1 Manitoba to command progressively higher premiums over No. 3.

These general tendencies may be noted in the data shown by crop years in Charts 4 and 5 (p. 44). The tendency for Canadian wheat to command higher premiums in recent years is clearly reflected in the marked upward trend in the price ratios of Manitoba wheats to each of the other principal wheats available each year in the British market (Chart 4). The year-to-year changes in the ratios differ among themselves because the ratios are affected by influences bearing especially on the prices of Canadian wheats and also by other influences bearing especially on the prices of each of the other wheats. Ratios to the prices of Rosafé wheat differ especially from the other ratios because the price averages related cover only a part of the crop year, usually December – July. Shipments of Argentine wheat to Europe are concentrated largely into the period January – April when Canadian shipments tend to be lightest. Sometimes Argentine wheat ceases to be quoted in the c.i.f. market before the end of June. Commonly the only quotations available in September–December are for new-crop wheat. December is the first month in which these may be regarded as quotations on wheat for early shipment.

Price relations between No. 1 and No. 3 Manitoba wheats reflect a tendency for the price of No. 1 Manitoba to rise relative to No. 3 when both rise relative to prices of other

CHART 4.—PRICE RATIOS OF MANITOBAS TO OTHER
WHEATS IN BRITISH MARKETS,
1921–22 TO 1936–37*
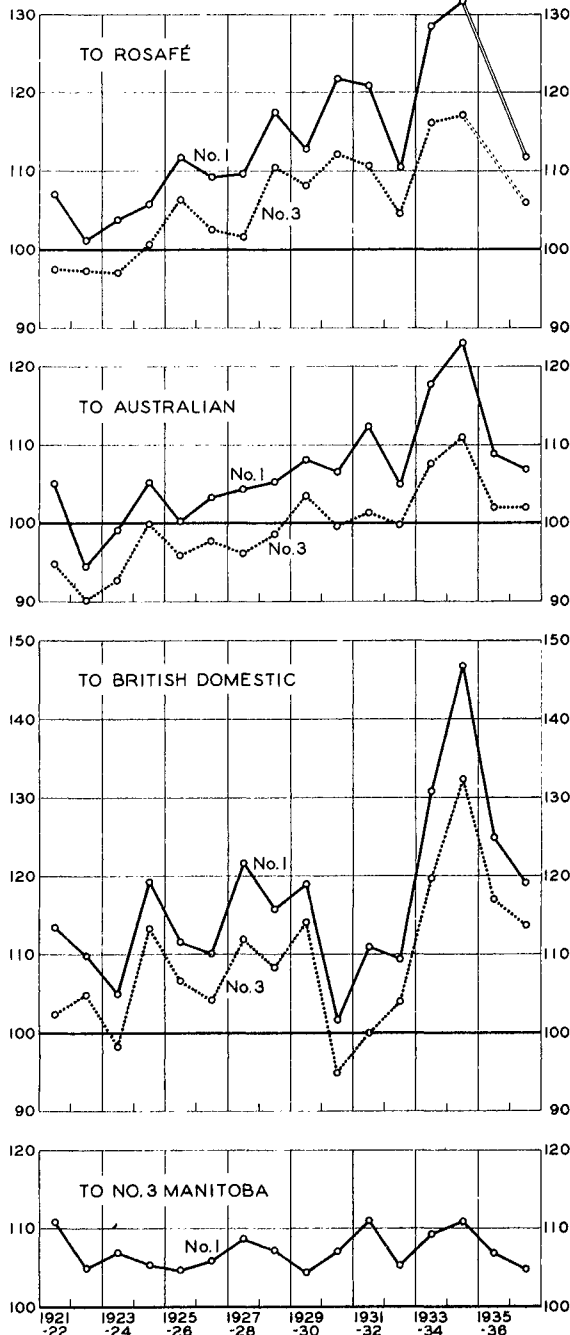
(Percentages)

* Percentages computed from averages in Table II and,
for Argentine wheat (Rosafé), from similar averages taken
over various intervals during December–July, depending on
the availability of quotations on Rosafé wheat.

wheats; but they reflect also other tendencies.
The price relations between these two grades
depend in part on quality differences that
change from year to year. In some seasons,
for example, No. 1 Manitoba averages much
superior to No. 3 in protein content. In other
years the difference between the two grades is
chiefly one of weight per measured bushel and
percentage of impurities. Recently the differ-
ence in the proportion of Garnet wheat allow-
able in the two grades of Manitoba Northern
has become an important source of price dif-

CHART 5.—PROPORTIONS OF CANADIAN AND RUS-
SIAN WHEATS IN "WORLD EXPORTS" AND IN
BRITISH IMPORTS, AND PRICE RATIOS, 1921–22
TO 1936–37*
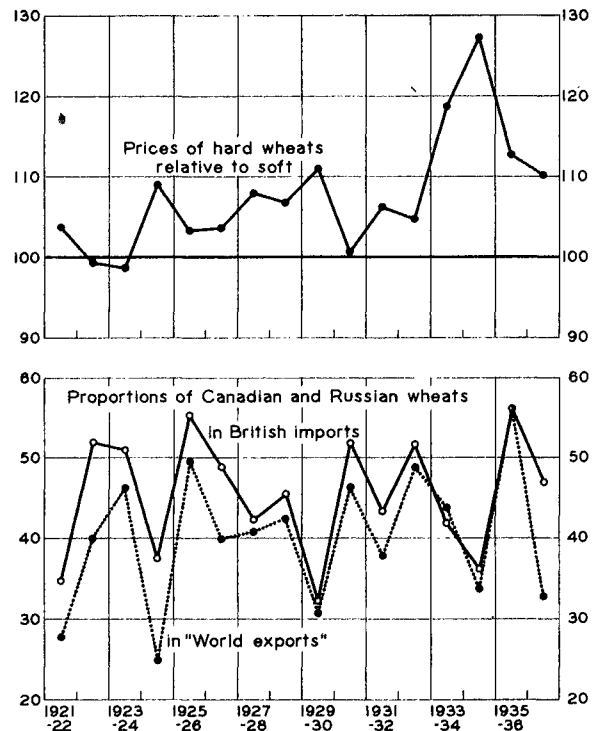
(Percentages)

* Data by crop years, from Tables III, IV, and V.

ference. The price relations between No. 1
and No. 3 Manitoba vary also with variations
in the percentage distribution of the Canadian
crop among the several grades.

The quality chiefly responsible for the spe-
cial price position of Canadian wheat is its
hardness. Special circumstances affect differ-
ently the relations of prices of particular

more or less hard wheats to prices of particular more or less soft wheats. The price effects of changes in the relative supply of hard wheat tend to be reflected best in the ratio of an average of prices of several representative hard wheats to an average of several representative soft wheats. There are few wheats, however, for which quotations are regularly available in any one market during the sixteen years from 1921–22. The broadest average for hard wheats consistently available in the British market is that which combines prices of No. 1 and No. 3 Manitoba; and the broadest average for soft wheats, that which combines prices of Australian and British domestic wheat. These are the averages for which ratios are shown in the upper section of Chart 5.[1]

In the lower section of Chart 5 are shown graphically the proportions of world net exports and of British imports, respectively, comprised of Canadian and Russian wheat together. Russian wheat seems in general to compete so directly with Canadian wheat on a quality basis, as regards protein, that the effects of supply on relative price of Canadian wheat may well be studied in terms of the combined supply from Canada and Russia. The highly variable demand for import wheat in the Orient differs notably in its quality requirements from the demand of most other importers. During postwar years the Orient has bought heavily from Canada only when the presence of large amounts of low-grade wheat in the Canadian supply made the price attractive irrespective of the special qualities for which Canadian wheat is usually bought by other importers. Consequently, the typical connection between relative supply and relative price of Canadian wheat appears more clearly in statistics from which exports to the Orient are excluded, as has been done somewhat roughly in the statistics of Canadian ex-

ports and of "world exports" employed for the ratio represented by the dotted line in Chart 5.

CHANGES IN PRICE RATIOS WITHIN SEASONS

In the autumn, traders in wheat attempt to form price judgments with more or less regard to price prospects for the season as a whole. Some traders take only a short view of price prospects, while others may form decisions chiefly from price judgments that look forward many months. Through the trading of those who form deliberate judgments looking forward to prospects in the spring and summer, and perhaps partly through more or less unreasoned reactions to present facts, wheat prices in the autumn of each year tend to be brought to a level which has reasonable prospect of being held without great change during the season. Despite this tendency, price changes occur between autumn and spring—sometimes large changes—either in response to unforeseen developments, or because the market effects of the varying individual judgments formed early in the season established a price more or less out of line with that warranted by the facts. Averages for a period of years, such as those appearing in Chart 1 (p. 40), nevertheless show seasonal trends that reflect credit on the ability of organized markets to anticipate price prospects without serious bias.

Some traders, especially exporters and importers and some millers, are particularly concerned with price relations. As other traders try to appraise prospects for the level of prices, so these try to appraise prospects for price relations. Their trading tends to establish the price of Canadian wheat in the autumn in an appropriate relation to prices of other wheats, having regard to the prospective supplies and requirements of the various kinds of wheat for the season as a whole. Under their influence, price relationships in the autumn tend to be so established that they may be maintained without great change during the season. But conditions are difficult to appraise with accuracy early in the season; and unforeseen developments may lead to an outcome not reasonably to have been anticipated early in the crop year. Thus price rela-

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[1] To obtain even this degree of variety in the quotations combined, it has been necessary to supply by estimation prices of No. 3 Manitoba for a considerable number of weeks in which quotations were lacking. The requisite prices were capable of fairly accurate estimation on the basis of the quoted price of No. 1 Manitoba on the British market and the price difference between No. 1 and No. 3 prevailing concurrently at Winnipeg.

tions, like the absolute level of prices, may change substantially during the season.

A summary view of changes in the price relations between hard and soft wheats in the British market from the first to the second half of each crop year is afforded by Chart 6. Hollow dots represent the ratios of price averages for August–January of each crop year and solid dots the ratios of price averages for February–July. To draw attention to the

CHART 6.—PRICE RATIOS OF HARD WHEATS TO SOFT WHEATS IN BRITISH MARKETS, SEMI-ANNUALLY, 1921–22 TO 1936–37*

(Percentages)
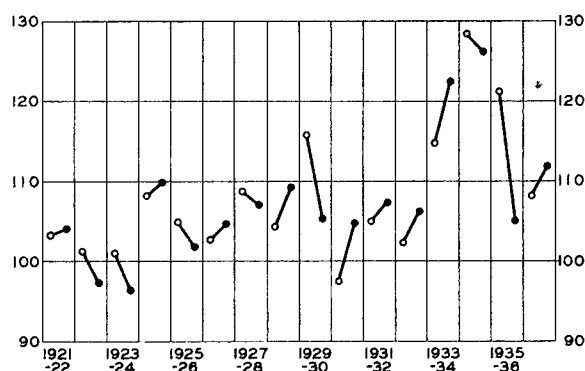
* Data from Table V. The hollow dots represent ratios of August–January price averages; the solid dots ratios of February–July averages.

changes in ratios within the crop year, connecting lines have been run only between dots representing averages within the same crop year.

Over the sixteen years 1921–22 to 1936–37, the average price of the hard (Canadian) wheats in the British market during the first half of the season has been 107.2 per cent of the average of the soft wheats. For the second half of the season the average price of the hard wheats in those sixteen years has been 106.4 per cent of the average of the soft wheats. If comparison be made between the Winnipeg price of No. 1 Manitoba and the British price of soft wheats, it appears that in the first half of the crop year the average price of the hard wheat was 92.6 per cent of that of the soft wheat and in the second half of the crop year, 93.7 per cent. In terms of British prices, the Canadian wheat averaged about 1 per cent

lower relative to soft wheats in the second half of the crop year than in the first half; but in terms of the Winnipeg price, the Canadian wheat averaged about 3 per cent higher relative to British prices of the soft wheats in the second half of the crop year than in the first half. The Winnipeg price tends to benefit relatively in the second half of the season from lower shipment costs than in the first half.

When altered conditions in one crop year have called for an important change in the price ratio from that prevailing in the previous season, the price ratio established in the first half of the crop year has sometimes been extraordinarily close to that which was maintained for the season as a whole; the years 1924–25 and 1934–35 afford striking examples. On the other hand, the price ratio in the first half of the crop year sometimes appears to have reflected a notably inadequate adjustment to the changed conditions, as in 1933–34 and 1935–36; and sometimes the price ratio in the first half of the season appears to have reflected an excessive adjustment, as in 1929–30 and 1930–31.

Of course, some of these changes in the ratios within the crop year have been associated with substantial changes in conditions not predictable early in the season. In 1935–36 — the most extreme example — Manitoba wheats were priced during the autumn on the assumption that the newly organized Canadian Wheat Board would follow a policy involving only moderate reduction of the Canadian carryover. After a new Dominion government came into power and the Wheat Board was reconstituted, it became apparent that import markets were to be called on, if possible, to absorb during the remainder of the season a large proportion of the wheat surplus remaining in Canada. Moved into importing markets in such quantities, Canadian wheat could command little premium over other wheats.

The changes in the ratios within other seasons have less simple and obvious explanations. To consider them here would unduly prolong discussion of a subsidiary point in the present study. It is sufficient for present purposes to note that the price relation be-

tween hard and soft wheats in importing countries must change from season to season; that the price relation must sometimes change substantially within the crop year, either because the appropriate relation was not accurately judged at the beginning of the season, or because conditions altered during the course of the season; and that there has been no apparent tendency for Canadian wheat to be either generally underpriced or generally overpriced relative to soft wheats during the first half of the season.

III. AVERAGE EFFECTS OF RATE OF COUNTRY MARKETING ON FUTURES PRICES

SPECIFIC EFFECTS OF RATE OF MARKETING

Demonstration of the existence of seasonal tendencies in prices correlated with seasonality in marketing goes only a short way toward indicating the effects of rate of marketing on price. The typical price decline at about the time marketing of a new crop begins may result chiefly from augmentation of supplies rather than from the rate of marketing itself. Indeed, such an inference is supported by the fact that prices of British domestic wheat show a wider seasonal variation than do prices of Canadian wheat, although the seasonal variation in rate of marketing is much greater for Canadian wheat (pp. 40–41). To ascertain whether rate of marketing has a price effect on its own account and to determine the nature of that effect, it is necessary to resort to other methods of analysis. In the present section and the following one we proceed to such further examination of the statistical evidence, building on the information already presented.

In this further analysis one must use price data for periods much shorter than a month, and relate the price changes to corresponding changes in the rate of country marketing of wheat. For best results, daily data must be employed. The heavy labor of statistical analysis thus involved is kept down by considering only data falling within the four months August–November of each year. The small changes in rate of country marketing usual in subsequent months of the marketing season can have little price effect, and may be left out of consideration with little loss of information.

In this more specific examination of the price effects of rate of marketing, reliance has to be placed chiefly on measurements in terms of price relations rather than in terms of absolute prices. The price effects specifically attributable to rate of country marketing are small in comparison with the effects of other price influences. Even in averages taken over many years, the effects of these other, major, price influences cancel out only incompletely. Their effects obscure and distort the evidence of price effects of rate of marketing. Price *relations* between Canadian and other wheats, however, are little affected by the major general price influences, since the latter affect most prices similarly. At the same time, these price relations reflect most or all of the price effects specifically attributable to rate of country marketing of wheat in Western Canada.

For a study of daily price relations, futures prices afford the most suitable basis.[1] It is

[1] If both the Winnipeg and the Liverpool futures required delivery of the same grade and quality of wheat in fulfillment of the contract, the price difference between them would ordinarily reflect chiefly shipping and trading margins for moving the wheat from the point at which it is deliverable on the Winnipeg future (elevators in Fort William and Port Arthur) to the most accessible point from which it would be deliverable on the Liverpool future. Canadian wheat may be tendered on the Liverpool futures, but ordinarily other deliverable wheats afford a more economical means of fulfilling futures contracts at Liverpool. Only during parts of 1922 and 1932, among postwar years, has Canadian wheat been tendered on Liverpool futures contracts. With the futures in the two markets priced ordinarily on expectation of delivery of different wheats in each market, the price spread between the two futures varies more widely than it would if delivery of the same grade and quality of wheat were expected in each market. The price spread between Winnipeg and Liverpool depends not only upon shipment costs, but also on influences that affect the price relations in the British market between Canadian wheat and other wheats tenderable on the Liverpool future.

If the Liverpool December future is priced on the basis of expectation of delivery of Australian wheat, for example, changes in price relations between Australian and Canadian wheat in the British market will tend to be accompanied by equal changes in the price

desirable to use quotations applicable to Canadian wheat in Canada and to other wheat in the British market. In the British market especially, the futures prices are more sensitive than the available cash quotations. On the futures, practically simultaneous quotations are available for the Liverpool and Winnipeg markets. Availability of nearly simultaneous quotations is of great advantage, for if the quotations are recorded at widely different times within the day, price changes during the interval seriously distort the indications of changes in price spreads from day to day; and the spurious changes in the indicated spread, due merely to price change over the interval between quotations, may easily exceed considerably the true change in the price spread, either in the same or in the opposite direction. To the extent that rate of country marketing has its effect through the medium of hedging pressure in the futures market, it is especially appropriate to look for the effect in futures prices.

THE BASIC DATA

Statistics of country marketings of wheat by weeks are not sufficiently detailed to reflect clearly the extent and timing of some of the significant changes in the rate at which country deliveries are made. For the present study we have accordingly used daily data, which are available from 1922.[1] These are recorded graphically in Charts 7 and 8. They afford a virtually complete record of all country deliveries of wheat to elevators and at platform stations in the Prairie Provinces.

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relation between the Winnipeg and the Liverpool futures. A relative increase in the price of No. 1 Manitoba wheat in the British market will tend to be accompanied by an equal increase in the price of the Winnipeg future relative to that of the Liverpool future. Conversely, an increase or a decrease in the price of the Winnipeg future relative to the Liverpool future, other things being equal, will tend to be accompanied by a similar increase or decrease in the price of No. 1 Manitoba wheat in Liverpool relative to that of Australian wheat (supposing still that it is Australian wheat which is expected to be tendered on the Liverpool futures contracts).

[1] We are indebted to Mr. W. Sanford Evans of Winnipeg for providing these data, which his organization regularly assembles from telegraphic reports obtained from the Canadian railroads.

The rate of farm marketing may be supposed a significant price influence only while

CHART 7.—COUNTRY DELIVERIES OF WHEAT IN WESTERN CANADA AND WINNIPEG-LIVERPOOL PRICE SPREAD, DAILY, AUGUST–NOVEMBER, 1922 TO 1929*

(Million bushels; Canadian cents per bushel)
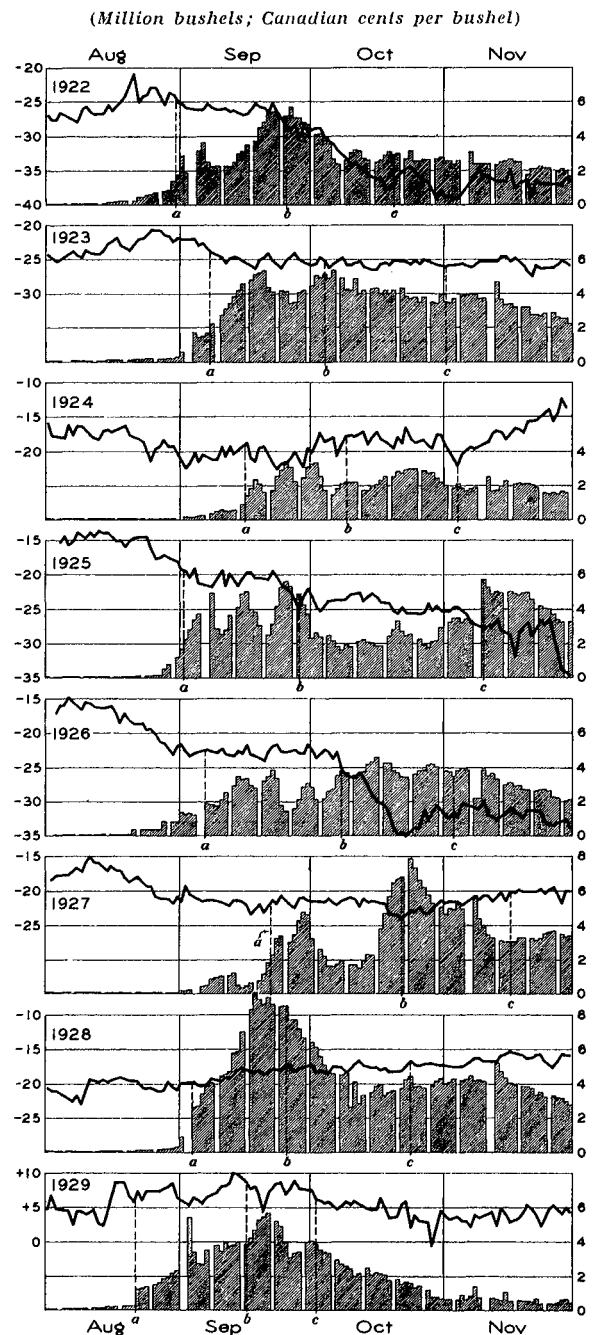
* Data as described in the accompanying text. The points designated as *a, b, c* indicate respectively the dates of beginning of rapid marketing and completion of 25 per cent and 50 per cent of deliveries for the season (Table 1, p. 51).

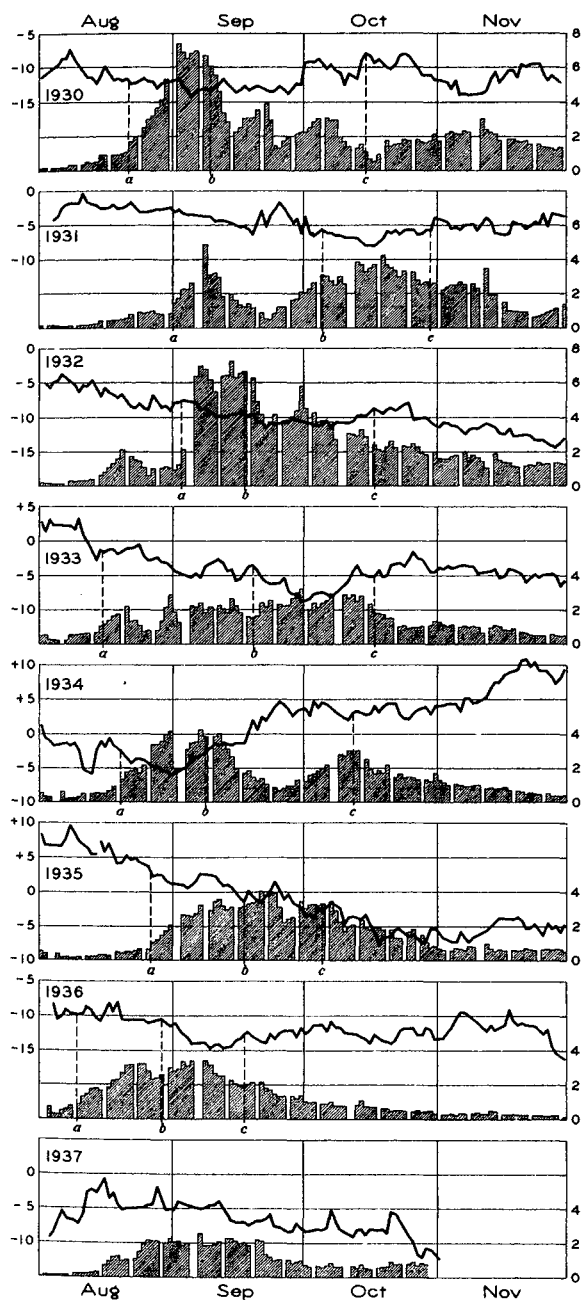daily deliveries are running fairly large. During recent years the period of fairly heavy daily deliveries has been confined to the four

CHART 8.—COUNTRY DELIVERIES OF WHEAT IN WESTERN CANADA AND WINNIPEG-LIVERPOOL PRICE SPREAD, DAILY, AUGUST–NOVEMBER, 1930 TO 1937*

(Million bushels; Canadian cents per bushel)

* See footnote to Chart 7.

months of August–November. Prior to 1929, the period in which deliveries were large fell more generally in the months September–December. In December, however, the price effects are sometimes obscured by the emergence of abnormal conditions affecting the price spread between Winnipeg and Liverpool. The December future at Liverpool is then soon to expire, and if a temporary shortage of spot wheat develops, the price of the December future at Liverpool may advance sharply without a corresponding advance at Winnipeg.

Daily price spreads between Winnipeg and Liverpool are shown by the heavy irregular lines in Charts 7 and 8. They have been computed from Liverpool closing quotations and Winnipeg quotations taken usually 15 minutes before the Liverpool close—about the latest Winnipeg quotation to which Liverpool has opportunity to respond before its close. On Saturdays the Liverpool market closes before the Winnipeg market opens, and the best available comparison is that with the Winnipeg opening price. The spreads are thus based generally on Winnipeg quotations taken about 45 minues after the opening of that market except on Saturdays, when they are based on opening prices.

The country deliveries during one day can only by anticipation affect the price spread recorded for that day. Presumably most of the immediate price influence of the deliveries of one day is reflected in the spread recorded for the following day. To the extent that the volume of deliveries has its direct effect on the price spread through hedging sales, some of this effect may not be felt until the second following day, in consequence of delay in the placing of hedge sales until after the early morning hour for which the price spread is recorded.

Liverpool prices have been employed directly in certain averages considered below, but no evidence has been found that inclusion of daily prices at either Liverpool or Winnipeg in Charts 7 and 8 would contribute to the study of price effects of changes in the rate of marketing. Their inclusion would complicate the charts and hinder study of such price effects as are observable in a daily record of the price spread.

SEASONAL TENDENCIES IN DELIVERIES,
PRICES, AND SPREADS

Study of Charts 7 and 8 reveals that in some periods the Winnipeg price declined or advanced relative to Liverpool rather systematically as deliveries increased or decreased. In other periods, no systematic relation is apparent. In still other periods, quite illogically, the Winnipeg price advanced relative to Liverpool when deliveries increased, and declined when deliveries declined. The principal conclusion possible from visual study of the graphic record in full detail is that, in general, the changes in Winnipeg prices relative to Liverpool result from influences other than the rate of country marketing. If changes in the rate of country marketing tend regularly to be reflected in changes in the Winnipeg price, the effect must be generally small in amount, and frequently obscured or offset by other more potent influences.

More positive conclusions are possible only on the basis of summarizations in the form of measures of average influence of the rate of country delivery of wheat. Various methods may be used for such summarization. The analysis presented in subsequent pages gives results of applying four different methods of summarizing the data. In part the results of these four methods serve as a check one against another. In part the results emphasize different aspects of the relations under consideration, and so supplement each other. Final conclusions regarding the effect of rate of country marketing on the Winnipeg price are drawn only after considering the evidence from all four methods of analyzing the data.

Perhaps the simplest method of summarizing the data is in terms of seasonal averages. Chart 9 shows the average course of three pertinent series through the four months August–November: (1) the daily country deliveries of wheat in Western Canada; (2) the price of the Liverpool December future; and (3) the price spread between Winnipeg and Liverpool. These averages are obtained by the simple process of combining all the data for corresponding days in the fifteen years from 1922 to 1936. The first point plotted in each series is an average for the first five business days in all fifteen years. Successive points are

averages for successive groups of five business days.

In the upper section of the chart the averages for deliveries and price spread appear on the same scales used for Charts 7 and 8, to

CHART 9.—SEASONAL AVERAGES OF DAILY COUNTRY DELIVERIES OF WHEAT, LIVERPOOL DECEMBER FUTURE, AND WINNIPEG-LIVERPOOL SPREAD, AUGUST–NOVEMBER, 1922 TO 1937*

(Million bushels; Canadian cents per bushel)
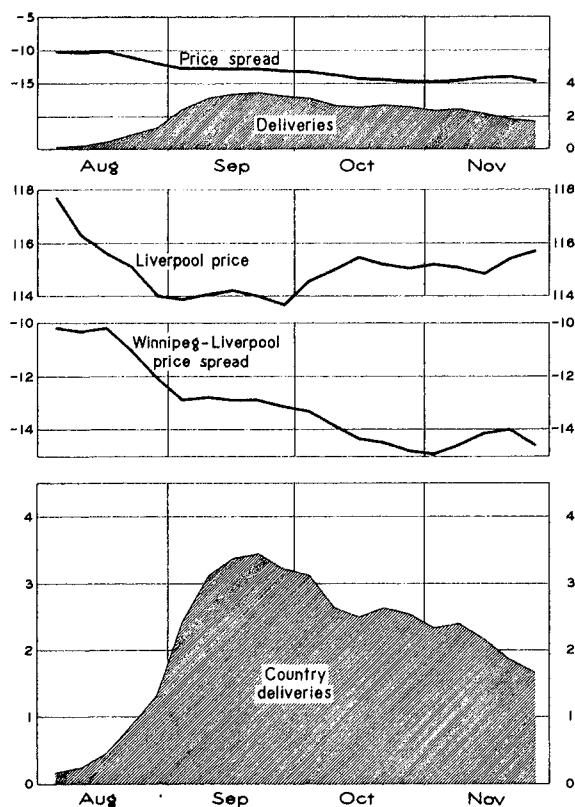
* Computed from 5-day averages of prices of December futures and statistics of daily country deliveries, as described on pp. 48–49. In the upper section of the chart the averages are plotted to the same scales used for the corresponding data by individual years shown in Charts 7 and 8. In the lower section these averages and the Liverpool price averages are shown on enlarged scales which emphasize the changes and permit more accurate comparisons.

afford a true basis for comparison of the averages with the records for individual years. In the lower section of Chart 9 the data are shown on a larger scale that emphasizes changes and facilitates their study.

Correspondence between the average course of country deliveries and the average course of the other two series shown in Chart 9 is

close only through August and the first few days of September. From mid-August to early September the price of the Winnipeg December future shows an average relative decline of nearly 3 cents, from an average of about 10 cents under the Liverpool December future at mid-August to 13 cents under in early September. Over the same interval, deliveries of

by a slight advance in Winnipeg prices relative to Liverpool.

Whether the relationships shown by these averages reflect a causal connection, whether they indicate true general tendencies which are more or less independent as to cause, or whether the relationships are largely accidental and might not be observed in averages

TABLE 1.—SIGNIFICANT DATES AND INTERVALS IN COUNTRY MARKETING OF WHEAT IN WESTERN CANADA, 1922–23 to 1936–37*

Crop years	Start of rapid marketing[a]	25 per cent point	50 per cent point	End of main movement[b]	75 per cent point	Length of intervals (days)			
						To 25 per cent point[c]	Second 25 per cent	"Tail"[d]	Third 25 per cent
1922–23.....	Aug. 31	Sept. 25	Oct. 20	Nov. 30	Nov. 27	25	25	41	38
1923–24.....	Sept. 8	Oct. 4	Nov. 1	Nov. 30	Dec. 14	26	28	29	43
1924–25.....	Sept. 16	Oct. 9	Nov. 4	Dec. 5	Dec. 17	23	26	31	43
1925–26.....	Sept. 2	Sept. 28	Nov. 10	Dec. 18	Dec. 4	26	42	39	25
1926–27.....	Sept. 7	Oct. 8	Nov. 3	Dec. 3	Dec. 11	31	26	30	38
1927–28.....	Sept. 22	Oct. 22	Nov. 16	Dec. 2	Jan. 13	30	25	16	58
1928–29.....	Sept. 4	Sept. 25	Oct. 24	Nov. 30	Nov. 30	21	29	37	37
1929–30.....	Aug. 22	Sept. 16	Oct. 2	Oct. 28	Nov. 8	25	16	26	37
1930–31.....	Aug. 22	Sept. 9	Oct. 15	Nov. 21	Jan. 7	18	36	37	84
1931–32	Sept. 1	Oct. 5	Oct. 30	Nov. 16	Jan. 29	34	25	17	91
1932–33.....	Sept. 3	Sept. 17	Oct. 17	Oct. 31	Feb. 3	14	30	14	109
1933–34.....	Aug. 16	Sept. 19	Oct. 17	Nov. 4	Feb. 13	34	28	18	119
1934–35.....	Aug. 20	Sept. 8	Oct. 12	Nov. 2	Jan. 8	19	34	21	88
1935–36.....	Aug. 27	Sept. 17	Oct. 5	Oct. 29	Nov. 26	21	18	24	52
1936–37.....	Aug. 10	Aug. 29	Sept. 17	Oct. 7	Nov. 16	19	19	20	60

* Computed from data used for Charts 7 and 8 and appropriate supplementary statistics. These dates and intervals differ somewhat from those appearing in a similar table in Holbrook Working, "The Timing of Wheat Marketing in Western Canada," WHEAT STUDIES, October 1936, XIII, 44, which were calculated from the weekly official statistics of country deliveries. The daily data permit more accurate dating of the beginning of rapid marketing and seem to record more faithfully the course of subsequent marketings. While the official statistics of country deliveries may be superior in some respects, as a record of fluctuations in the course of deliveries, they seem to have suffered from a tendency toward somewhat tardy reporting of a variable proportion of the deliveries. Substitution of the dates shown above for those used in the earlier study leads, however, to no significant alteration of the conclusions reached in that study.

[a] First day on which deliveries exceeded ½ per cent of seasonal total.

[b] Last day on which deliveries exceeded ½ per cent of seasonal total.

[c] From the start of rapid marketing.

[d] The final portion of the period of rapid marketing, extending from the 50 per cent point to the end of the main movement.

wheat at country points increased from an average of 460,000 bushels daily to an average of 2,430,000 bushels daily.

Further increase in the average rate of delivery to a maximum of 3,420,000 bushels daily about the third week of September was accompanied on the average by no further decline in the Winnipeg price relative to Liverpool. Subsequently, however, as the rate of delivery fell off to early November, Winnipeg prices suffered a further decline of about 2 cents relative to Liverpool. Further decline in the average rate of country deliveries during November was accompanied on the average

for some other period, are pertinent questions to be considered at a later stage.

The average course of Liverpool prices was downward during August of the fifteen years from 1922 to 1936, the decline in the averages amounting to nearly 4 cents. During September the price averages changed little; during the first half of October they advanced about 1.5 cents; and thereafter they changed little through November. Whether any of these changes in the averages of Liverpool prices deserves serious consideration is open to question. If there is a true general tendency for the Liverpool price to decline about 4 cents

during August, that tendency may rest on a number of circumstances of which Canadian farm marketing is only one. Spring wheat in the United States starts to market in August, generally a week or two earlier than the Canadian crop. When Russia has exported heavily, sales of Russian wheat have usually begun in August or late July. In an average year, shipments of wheat from exporting countries fall to a minimum about mid-July and increase rapidly during August, tending to relieve any scarcity of spot wheat that may have developed in importing markets.

### TENDENCIES BY MARKETING PERIODS

A simple calculation of seasonal tendencies computed on a purely chronological basis, such as that used above, tends substantially to misrepresent the typical course of country marketing of wheat in Canada. For example, deliveries tend to start with a rush at the beginning of the marketing season, increasing much more rapidly than is indicated by the average curve shown in Chart 9. "Rapid marketing" may be defined as beginning with the day on which deliveries on a single day exceeded .5 per cent of the total to be delivered during the season.[1] Deliveries on the second day prior to the beginning of rapid marketing, thus defined, averaged only 850,000 bushels during the fifteen years from 1922 to 1936. Deliveries on the third day after the beginning of rapid marketing averaged 2,830,000 bushels. The average rate of delivery increased 3⅓ times during this 5-day interval. But according to the seasonal averages (Chart 9), the rate of delivery did not as much as double over the corresponding 5-day interval. The rise in the curve of seasonal averages is misleadingly gradual because it takes no account of the substantial variation in the date at which rapid marketing starts (Table 1, p. 51).

Averages computed on the basis of marketing periods determined from the actual course of deliveries are shown by the shaded areas and by the heavy curves in Chart 10. With

[1] This is equivalent to the definition of rapid marketing as represented by delivery of over 3 per cent weekly, used in our earlier analysis in "The Timing of Wheat Marketing in Western Canada," WHEAT STUDIES, October, 1936, XIII, 33-64.

reference to these curves, the dates shown on the horizontal scale are merely average dates. For purposes of comparison, the curves of Chart 9 are reproduced as light lines in Chart 10.

The shaded area and the heavy curves extending between the average dates August 19 to September 12 represent averages for 20

CHART 10.—AVERAGE COURSE, BY MARKETING PERIODS, OF DAILY COUNTRY DELIVERIES, PRICE, AND SPREAD, AUGUST–NOVEMBER, 1922 TO 1937*

(Million bushels; Canadian cents per bushel)
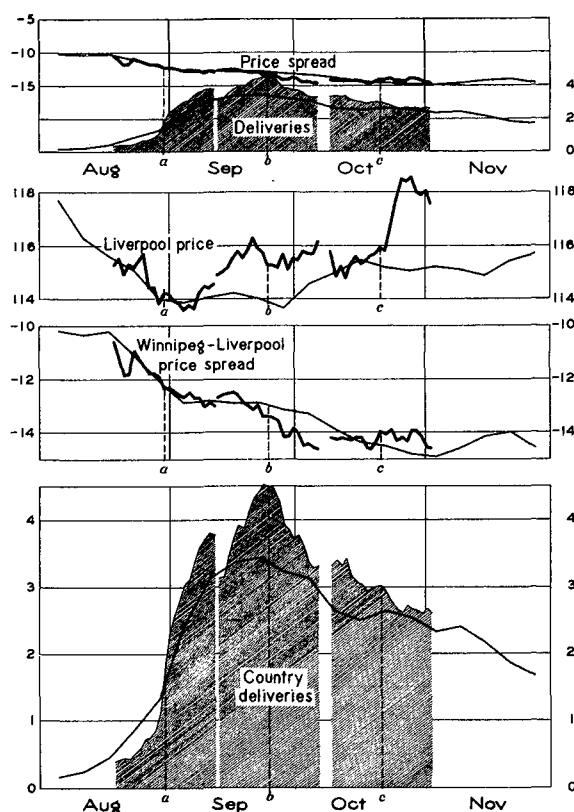
* Averages shown by heavy lines and by the shaded areas computed as for Chart 9, but from daily data from the tenth day before to the tenth day after the date of: (a) the beginning of rapid marketing; (b) the completion of 25 per cent of the season's deliveries; and (c) the completion of 50 per cent of the season's deliveries (see Table 1). These averages are plotted according to their *average* dates. For comparison there are shown as light lines the averages of Chart 9, which were computed on a simple chronological basis.

business days, or about 25 calendar days, centering on the day of beginning of rapid marketing as defined above. The heavy curves extending between the average dates September 12 to October 6 are similarly centered on

the date at which total deliveries from August 1 reached 25 per cent of the total marketable supply for the season. The heavy curves extending from the average dates October 9 to November 2 are centered on the date at which total deliveries from August 1 reached 50 per cent of the total marketable supply for the season. The actual dates on which these central points fell in each year of 1922 to 1936 are shown in Table 1.

The averages computed on the basis of marketing periods show three characteristics of farm marketing that appear only obscurely or not at all in the averages computed on a merely chronological basis. (1) The rate of country deliveries increases very rapidly at the beginning of the marketing movement. (2) The rate of country deliveries tends to reach a clearly marked maximum falling, in the averages, almost exactly on the date at which delivery of 25 per cent of the total for the season was completed. (3) The rate of delivery tends to decline rapidly during the 21 business days centered on the date at which total deliveries reach 50 per cent of the seasonal total.

In the ordinary seasonal averages, the curve of deliveries shows a broad and rounded summit owing to the wide range of variation in the date at which the 25 per cent point is reached. In some individual years the peak is much more clearly marked than in others, and in some years it falls several days earlier or later than the 25 per cent point (Charts 7 and 8). Weather conditions in the Prairie Provinces may exert a pronounced influence on the course of farm marketing. In particular, unfavorable weather may check the rate of delivery at times when it would normally be rapid.

The data shown in Chart 10 afford some indication of whether seasonal changes in prices and in price spreads that are associated with seasonal changes in country deliveries are actually a direct consequence of the changes in country deliveries. On the average, Winnipeg prices have declined relative to Liverpool from mid-August, when the rate of Canadian country deliveries has tended to increase rapidly. The characteristic tendency for rapid increase in the rate of delivery ap-

pears much more clearly in the averages computed on the basis of the actual date of beginning of rapid marketing in each year. If the decline in Winnipeg prices is a direct effect of the increased rate of marketing, induced perhaps by hedging pressure, the change in the Winnipeg-Liverpool spread should also appear more clearly in the averages computed on the basis of the actual date of beginning of rapid marketing—the averages represented by a heavy line in Chart 10. Actually, the average change in the Winnipeg-Liverpool spread at about the time of beginning of rapid marketing is if anything rather steeper and more pronounced in the simple seasonal averages than in the averages based on the date of actual beginning of rapid marketing. Interpreted in the light of these considerations the record suggests that, whatever the cause of the average decline of about 3 cents in Winnipeg prices relative to Liverpool from about mid-August, the decline is not directly connected with the rate of country deliveries.

Perhaps the tendency for Winnipeg prices to suffer some relative decline after about mid-August is associated with the fact that at about this time it is normal for export sales to be made in greatly increased volume and for North American shipments of wheat to increase rapidly. If during the summer Winnipeg prices of new-crop futures have been held at too high a level to permit export sales in large volume, the need for a downward adjustment tends to become clear in August or early September. As shipments from North America increase, ocean freights tend to advance, with a consequent tendency for the normally negative price spread between Winnipeg and Liverpool to widen. These are tendencies which would not develop at precisely the same dates in each year, nor at precisely the same time relative to the date of beginning of rapid marketing in Western Canada. They might be about equally related to chronological time and to crop-movement time. If so, they would be reflected similarly —as they are—in averages based on calendar dates and in averages based on dates referred to the actual course of marketings.

Conclusions of a different character are indicated for the period when marketing is

typically most rapid, centering on the date at which the first 25 per cent of country deliveries are completed. Averaged on a purely calendar basis, the price spreads show only a slight tendency to widening during September. Averaged for the specific 21 days centered on the date of the 25 per cent point in each year, however, the price spread shows a widening of about 2 cents developing progressively during the 21 business days for which the average rate of delivery was near its highest level. This suggests that during the period of most rapid country marketing there may be a small but real tendency for hedging pressure to cause progressive weakening of Winnipeg prices.

The subsequent average course of prices, however, suggests that the effect of the hedging pressure may be merely to force the Winnipeg price to a level at which importers are willing to buy Canadian wheat freely. There is no apparent tendency for Winnipeg prices to recover relative to Liverpool as the rate of country delivery declines and hedging pressure relaxes. On the average, country deliveries decline rapidly during the 10 days after the 25 per cent point in deliveries is reached, and continue to decline during the 21 business days centering on the date at which 50 per cent of the seasonal deliveries are completed. Exports during October–November have averaged about 1.5 million bushels per business day, and wheat consumption for milling and other commercial uses in Canada must have exceeded one-third of a million bushels daily, bringing the average total absorption of wheat to close to 2 million bushels daily during October and November.[1] The removal of hedges on wheat exported or consumed must tend nearly to offset the hedging of newly delivered wheat soon after the 50 per cent point in deliveries is reached. The decline in rate of delivery from an average of about 4.5 million bushels daily at the time the 25 per cent point has been reached to an average of 2.6 million bushels daily shortly after the 50 per cent point has been reached about a month later has, however, not been accompanied by any apparent

tendency for Winnipeg prices to strengthen relative to Liverpool.

The averages of Liverpool prices for periods related to the stages in Canadian marketing show some substantial differences from the seasonal averages for calendar intervals (Chart 10), but the differences merely emphasize the essential instability of the price averages and their lack of reliability as indices either of a general seasonal tendency or of a tendency for Liverpool prices to be influenced by the rate of Canadian country deliveries. It must be wholly by accident that Liverpool prices average higher for the interval centering on the actual date of the 25 per cent point in deliveries than for the calendar interval centering on the average date on which this point falls.

It must be wholly by accident also that the averages show a sharp advance in Liverpool prices immediately after completion of 50 per cent of the deliveries for the season in Western Canada. Perhaps a logical explanation for such an advance might be given if the precise date of the 50 per cent point were each year accurately known at the time, and widely advertised. In point of fact, the total deliveries for the season can be estimated in the autumn only roughly, and it is impossible to know at the time precisely when the 50 per cent point has been reached. Moreover, there has been no general interest even among Winnipeg traders in attempting to judge just when the 50 per cent point in deliveries has been reached each year. To suppose that attainment of the 50 per cent point in country deliveries in Western Canada tends generally to be followed by an advance of 2 cents in Liverpool prices during the following four days, as indicated by the averages, would be to exhibit an unwarranted confidence in unsupported price averages.

The obvious peculiarities in the Liverpool price averages clearly indicate a need for caution in drawing conclusions even from a feature of the averages that is not obviously unreasonable. It appears quite possible that the decline of the averages during August should not be taken as evidence of a true general tendency for prices of Liverpool futures to decline at this season. It is unquestionable

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[1] These figures have been calculated from official data not here reproduced.

that prices of cash wheat at Liverpool tend to decline from some time in August or slightly earlier, as noted on previous pages, but it is by no means clear that futures prices have a similar tendency.

It does not follow that the averages of the price spreads must be viewed with as much skepticism as the price averages. The price spreads during any season tend to be much more stable than either of the prices involved. For August–November 1922 to 1936 the average monthly change in price of the Liverpool December future have been 6.0 cents, while the corresponding average change in the Winnipeg-Liverpool price spread has been only 2.8 cents. The averages of the spreads are correspondingly more stable and more trustworthy than the averages of the prices. A change of 1 cent in the average price spread over an interval of one month is no more likely to reflect a mere peculiarity of the particular set of years employed for the averages than is a change of 2.2 cents in the average price.

IV. RECENT CHANGES IN PRICE EFFECTS OF COUNTRY MARKETING

PRICE EFFECTS OF SUSTAINED CHANGES IN RATE OF DELIVERY

The foregoing analysis of price effects of changes in the rate of country deliveries of wheat in Western Canada yields indications only of average tendencies for 15 postwar years taken as a group. Some important changes in conditions have occurred during these 15 years. During the later years of the period, rapid country marketing has tended to begin some two weeks earlier than formerly, and the first rush of marketing, including about one-fourth of the total for the season, has tended to be concentrated into a period about 15 per cent shorter. During part of the 15-year period about half of the country deliveries went into co-operative pools. Presumably the volume of hedging to be absorbed by the futures market was thus cut nearly in half. In some of these years the co-operative organization may have undertaken further to support prices through its export sales policy.[1] In later years a government-sponsored manager of the Central Selling Agency of the pools, and finally a Wheat Board operating under the Dominion government, endeavored to influence prices to some extent. It is pertinent, therefore, to attempt measurement of any changes that may have occurred during the 15 years under review in the relation between changes in country deliveries and changes in the Winnipeg-Liverpool price spread.

[1] This is a disputed point which requires mention here, though we make no attempt in the present study to adduce evidence on it.

A suitable method for study of price effects of the rate of country deliveries year by year is afforded by analysis of changes over 5-day periods. During the approximately 100 business days of August–November in each year there are twenty such 5-day periods, and nineteen changes between successive 5-day periods. It is possible to compute for each year the change in the Winnipeg-Liverpool spread associated, on the average, with unit change in the rate of country delivery of wheat.

In years when favorable weather has permitted country deliveries to follow a smooth course without important interruption, the nineteen changes in rate of delivery between 5-day periods include only six or eight changes large enough to afford very satisfactory opportunity for measuring the apparent effect on the Winnipeg-Liverpool spread. In years in which intervals of bad weather have sharply curtailed the rate of delivery two or three times during the period of rapid marketing, there may be ten or twelve fairly large changes in rate of delivery between 5-day periods, affording a correspondingly sounder basis for judging the average effect of such changes on the Winnipeg-Liverpool spread.

The foregoing study of average tendencies for the fifteen years as a whole has indicated that the price effects of change in the rate of country delivery may tend to be different at different stages in the marketing movement. It would be desirable to take account of this indication, if it were possible, in the study of relations in individual years; but the number of significantly large changes in rate of country delivery during any one year is too

small to warrant calculation of more than a single average measure of relationship applicable to the August–November period as a whole.

As regards the effect of the rate of Canadian country deliveries on the Liverpool price, theoretical considerations and statistical results discussed above are taken as sufficient evidence that any further analysis of this relation would prove futile. Probably Liverpool prices respond only insignificantly, if at all, to changes in the rate of country delivery of wheat in Western Canada; and it seems quite certain that if changes in the rate of Canadian farm marketing do affect Liverpool prices, the effects are so small relative to the effects of other price influences as to be below the threshold of statistical measurement.

The average apparent effect of changes in the rate of country delivery of wheat may be expressed in terms of cents or fractions of a cent of price change associated on the average with a change of 1 million bushels in the rate of daily delivery of wheat. Changes as great as 1 million bushels in the average rate of delivery rarely occur between successive 5-day periods. This unit for measurement therefore does not represent a typical or normal change over a 5-day interval, but it is a convenient unit in which to express the measurements. The results of the statistical calculations, thus expressed in terms of coefficients and their standard errors, are as follows:

Year	Price effect	Year	Price effect
1922	$+.41 \pm .47$	1930	$-.31 \pm .28$
1923	$-.44 \pm .27$	1931	$-.45 \pm .31$
1924	$-.43 \pm .64$	1932	$-.20 \pm .12$
1925	$-.30 \pm .32$	1933	$-1.05 \pm .66$
1926	$-.54 \pm .85$	1934	$-1.02 \pm .47$
1927	$-.24 \pm .18$	1935	$+.29 \pm .47$
1928	$+.14 \pm .13$	1936	$-.96 \pm .56$
1929	$-.29 \pm .43$		

Among these coefficients measuring the indicated price effect of unit change in average rate of marketing[1] there is only one—that for 1934—which, standing by itself, would deserve to be taken seriously as evidence of a real price effect from change in the rate of country marketing. This coefficient alone exceeds twice its standard error. The coefficients show such consistency, however, that their

combined evidence points clearly to certain significant conclusions.

The coefficients vary greatly from year to year, but mainly in consequence of accidental coincidence between changes in rate of country delivery and other price influences. Sometimes other influences affecting the Winnipeg-Liverpool price spread result in a large change in the spread in the same direction as would be expected from the change in rate of country delivery of wheat. Sometimes the other influences cause the price spread to move in the direction opposite to that expected from the change in rate of country delivery. The record for each year includes only nineteen changes between 5-day periods. It readily occurs that in some years the coincidence between changes in rate of country delivery and other price influences is such as to yield an indicated average affect of the changes in country deliveries considerably greater than the actual effect. In other years the coincidence is such that the indicated average effect is even the opposite of the true effect. The possible range of influence of such coincidence is reflected statistically by the standard errors of the coefficients.

The figures for the first eleven of the sixteen years suggest that one general tendency was common to at least ten of the eleven years —all except 1928. The same tendency may have prevailed in 1928, but the evidence runs rather strongly to the contrary.[2] The indicated common tendency is for a change of 1 million bushels in the average daily rate of delivery from farms in Western Canada to tend to be accompanied by an opposite change

[1] Technically, these "measures of average price effect" are regression coefficients computed from first differences of 5-day averages of daily deliveries and of the price spreads. As tabulated above, each regression coefficient is followed by its standard error.

[2] For 1928 the calculated coefficient and its standard error are $+.14 \pm 13$. On the supposition that the true relation in this year would be expressed by a coefficient of $-.25$, the observed relation differs from the true by just three times its standard error. A deviation of this magnitude or larger is normally to be expected only about once in 300 or 400 samples. Here it occurs once in 11 samples (among the eleven coefficients for 1922 to 1932 inclusive).

The coefficient of $+.41$ in 1922 departs more widely from the supposed general tendency than does that for 1928, yet owing to its large standard error it falls well within the range of expected fluctuations of sampling.

of about ¼ of a cent in the Winnipeg price relative to Liverpool. That is, so far as can be judged from the averages, when the rate of delivery increased by 1 million bushels daily (say from 2 million daily to 3 million daily), the price of the December future at Winnipeg tended to decline about ¼ of a cent relative to the price of the December future at Liverpool; and when the rate of delivery decreased by 1 million bushels daily, the Winnipeg price tended to advance about ¼ of a cent relative to Liverpool.

These averages based on changes over 5-day intervals are not necessarily inconsistent with the somewhat different indications of evidence considered in the last section (pp. 53–54). It appeared from the data there examined that increases in the rate of delivery in the early periods of heavy marketing tended to depress the Winnipeg price, while decreases in the rate of delivery later did not tend generally to permit recovery in the Winnipeg price. Quantitatively this earlier evidence indicated that the average increase of about 4 million bushels in the daily rate of delivery from a few days before the beginning of rapid marketing to the maximum rate was accompanied by a relative decline of about 2 cents in the Winnipeg price, or a decline of about 3 cents by the time a relatively stable average spread was attained shortly after the 25 per cent point in deliveries. This relation reflected an apparent tendency for an increase of 1 million bushels in the daily deliveries to be accompanied or shortly followed by a relative decline of about ¾ of a cent in the Winnipeg price. On the other hand, the apparent effect of a decrease of 1 million bushels in the average rate of delivery, according to the earlier evidence, was nil.

Study of the two bodies of evidence in combination, including more detailed analysis of the changes over 5-day intervals than it is profitable to set down here, leads to the following conclusions applicable broadly to all the years from 1922 to 1932 inclusive. Early in the marketing season, as the rate of country deliveries increases, the Winnipeg futures price tends to be depressed moderately relative to Liverpool. The total price depression from mid-August to shortly after marketings

reached this peak averaged about 3 cents. This price tendency results perhaps from a tendency for the price of the Winnipeg December future in early August to stand too high relative to Liverpool, failing adequately to anticipate the decline in price of Canadian wheat relative to other wheats in the British market necessary to permit the requisite seasonal increase in proportion of Canadian wheat used by millers, and the seasonal advance in lake and ocean freights, in connection with increased shipments of Canadian wheat. This broad tendency toward moderate decline in Winnipeg futures prices relative to Liverpool as the rate of farm marketing increases is not followed by relative recovery of Winnipeg as the rate of farm marketing tends to decline.[1] But superimposed on this broad tendency, for Winnipeg first to decline moderately relative to Liverpool and then to hold its position, is a weaker tendency for Winnipeg to gain or lose relative to Liverpool as deliveries over 5-day periods increase or decrease. As regards this subsidiary tendency, the average effect of a change of 1 million bushels in the daily rate of country deliveries was to change the Winnipeg price about ¼ of a cent during 1922 to 1932.

For the four years from 1933 to 1936 the measurements of price effect of change in the rate of delivery are somewhat conflicting. In three of the years, it appears that a change of 1 million bushels in the daily rate of delivery tended to be accompanied by an opposite change of about 1 cent in the Winnipeg price relative to Liverpool—an effect four times as great as the average for previous years. In 1935, however, changes in the rate of delivery were accompanied, on the average, by small changes in the Winnipeg price in the *same* direction as the change in rate of delivery of wheat.

The detailed record in Chart 8 shows that the inverse correspondence between deliveries and price in the three years 1933, 1934, and 1936 was fairly consistent throughout the whole of August–November of each year. The statistical evidence tends strongly to the view

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[1] This supports the inference that the broad tendency to earlier decline is associated with requirements of the export trade, which does not fall off as farm marketings decline.

that some circumstance led to a tendency of price reaction much stronger in 1933, 1934, and 1936 than in earlier years, while in 1935 the character of price reactions was for some reason more or less similar to that in 1928. Additional pertinent evidence will be adduced in the next subsection. Consideration of possible explanations of the indicated peculiarities in price reactions in the last four years and in 1928 may well be deferred until after this evidence has been considered.

Meanwhile it is well to emphasize that, even in the years when price effects of variations in rate of country marketing appeared greatest, they were still small in comparison with the effects of other influences affecting the Winnipeg–Liverpool price spread. The comparative importance of the measurable effects of changes in rate of country delivery between 5-day periods is indicated by the coefficients of correlation between changes in the spread between 5-day periods and corresponding changes in average daily deliveries between 5-day periods, as follows:

1922	+.20	1930	−.26
1923	−.37	1931	−.34
1924	−.16	1932	−.37
1925	−.22	1933	−.36
1926	−.16	1934	−.46
1927	−.30	1935	+.15
1928	+.26	1936	−.38
1929	−.16		

Even the largest of these coefficients is comparatively small. The absolute significance of a coefficient of correlation, from the standpoint of relative importance of the factor whose effects it purports to reflect, is best judged from the square of the coefficient. The square of the largest coefficient above (−.46) is only .212, or about 1/5. This may be interpreted as meaning that at its maximum the indicated price effect of changes in rate of country delivery was such that it would normally require four other independent influences of equal importance to account for the total observed effect.

PRICE EFFECTS OF DAY-TO-DAY VARIATIONS IN DELIVERIES

The methods of statistical treatment employed in the foregoing analysis of relations between prices and the rate of country de-

livery of wheat in Western Canada have been such as to indicate only the effects of more or less sustained changes in the rate of delivery. It is a matter of considerable interest to know also whether the day-to-day fluctuations in the rate of delivery have been accompanied by corresponding inverse fluctuations in price from day to day. The question concerns primarily the ability of the Winnipeg market to absorb unexpected variations in the volume of hedging. Sustained changes in the rate of delivery might affect Winnipeg prices through one or more of several different channels. Day-to-day fluctuations in the country deliveries probably could produce corresponding day-to-day variations in the Winnipeg price only through the medium of hedging sales in the futures market.

Inquiry into this question is best pursued by considering specifically changes in the relation of Winnipeg prices to Liverpool prices. More precisely, we may ask: Has a sudden increase in country deliveries for a day or two, with its accompanying increase in hedging pressure, tended generally to depress prices at Winnipeg relative to Liverpool? And has a sudden curtailment of country deliveries, for a day or two, diminishing the volume of hedging, tended generally to induce a temporary advance in Winnipeg prices relative to Liverpool?

For purposes of the statistical analysis, it is most reasonable to assume that any price effect from the deliveries of one day should generally be reflected most clearly in the price spread on the next day. Such delay in the measurable price effect results partly from the fact that the calculated price spreads must be based on price quotations at an early hour of the trading session at Winnipeg—usually 45 minutes after the opening, except on Saturdays, when the opening price is used (p. 49). At such an early hour in the session there has usually been little or no hedging of the current day's country deliveries. By the end of the trading session, however, elevators have usually placed hedges covering most of their expected purchases for the day—purchases already made and those which they expect to make later in the day. The price effect of this hedging tends to be reflected more or less completely in the opening price next morning.

Early in the morning additional hedging orders are entered to cover elevator purchases made on the previous day but not covered by hedges placed before the close on that day. Some of the price effect of the hedging of one day's elevator purchases may not appear in the computed daily spread before the second following morning.

In these circumstances a suitable method for ascertaining the price effect, if any, of day-to-day fluctuations in deliveries is afforded by analysis of daily variations from 5-day averages, taking the spreads in all cases as of the morning of the day following that for which the corresponding deliveries were reported. The computed deviations from 5-day averages provide a basis for calculating the average deviation of the price spread associated with unit deviation of country deliveries from their 5-day average. To permit convenient comparison with results previously discussed, the unit deviation in deliveries is taken as 1 million bushels.

Thus are obtained the following coefficients indicative of the price effect, in cents per bushel, of day-to-day variations in country deliveries:

Year	Price effect	Year	Price effect
1922 ...	+.47 ± .36	1930 ...	+.05 ± .17
1923 ...	+.01 ± .20	1931 ...	−.10 ± .22
1924 ...	+.42 ± .37	1932 ...	+.09 ± .15
1925 ...	−.28 ± .24	1933 ...	−.58 ± .32
1926 ...	−.04 ± .24	1934 ...	−.59 ± .39
1927 ...	+.14 ± .23	1935 ...	−.39 ± .40
1928 ...	−.05 ± .11	1936 ...	−.29 ± .51
1929 ...	+.22 ± .32		

Actually, of course, deliveries on any one day rarely depart from the 5-day average by more than a fraction of 1 million bushels. The average or "normal" departure of daily deliveries from 5-day averages during August–November has ranged in different years from .15 to .50 million bushels. The largest coefficient in the foregoing tabulation indicates a tendency for the price to be depressed about .6 of a cent below the 5-day average if the deliveries were 1 million bushels above the 5-day average. Consequently it indicates that accompanying a "normal" departure of deliveries of, say, .35 million bushels from the

5-day average there tended to be a departure of price of only about .21 of a cent.

In the years in which the price was most sensitive to variations in daily deliveries, the indicated price effect of a variation of average size was not much greater than the minimum change that can be recorded in prices quoted in eighths of a cent. With numerous other, and more potent, influences affecting the Winnipeg price and the Winnipeg-Liverpool spread, the small price effects of variations in rate of delivery of wheat can be measured only roughly even by the use of statistical averages. The uncertainty of the averages (coefficients) thus obtained is reflected in the size of their standard errors, which are given in conjunction with the coefficients in the foregoing tabulation.

The statistical evidence for the eleven years from 1922 to 1932 inclusive gives no indication that day-to-day fluctuations in country deliveries had any influence on the price spread between Winnipeg and Liverpool. The evidence does not prove complete absence of any tendency for the Winnipeg price to be affected by fluctuations in daily deliveries, but it leaves no room for supposing that there existed a substantial tendency of the sort. It warrants the conclusion that for all practical purposes the Winnipeg market during 1922 to 1932 may be regarded as having been unaffected by such variations in hedging pressure as were associated with day-to-day variations in reported country deliveries of wheat.

In the four years 1933 to 1936 the conditions appear to have been notably different. In each of these years daily variations in country deliveries seem to have affected the Winnipeg price in about the degree represented by a price decline of .3 to .6 of a cent for an increase of 1 million bushels in daily deliveries. The evidence for any one of the four years taken by itself would not be convincing, since none of the coefficients is double its standard error. But with the data for four successive years giving similar indications, the evidence is rather strong that in these four years as a group the Winnipeg futures market was actually affected by fluctuations in hedging pressure associated with daily variations in country deliveries.

The evidence that during 1922 to 1933 Winnipeg wheat prices were substantially unaffected by daily variations in country deliveries is not necessarily inconsistent with the evidence, previously discussed, that Winnipeg prices responded significantly to more sustained changes in the rate of country delivery, such as are reflected in changes between average rates of delivery for 5-day periods. The difference in apparent price response is suggestive, however, of a difference in the manner in which the influence comes to bear on the price, according as the change in rate of delivery is transitory or sustained.

The supposition that a sustained increase in the rate of country delivery tends to depress the Winnipeg price through the mechanism of hedging pressure in the futures market leads naturally to the supposition that an increase in rate of delivery maintained for not more than 2 or 3 days should also be found to depress the price. There is even ground for supposing that a transitory increase might have the larger price-depressing influence. Speculative markets tend in general to be strongly influenced by unexpected developments at the time they occur, but to show little response at the time of occurrence to expected developments. The price effect of the expected development is shown in advance of its actual occurrence. Thus the appearance of an official report indicating that the wheat crop has suffered severe damage may evoke no price response in the market if the nature of the report has been correctly anticipated, as is commonly the case. Only when the official report shows unexpected indications is it likely to evoke a conspicuous price response. The sustained changes in rate of country delivery are generally expected, whereas the transitory changes commonly carry with them a certain element of surprise. The evidence, however, runs contrary to what would be expected on this line of reasoning. It indicates that during 1922 to 1932 the more or less unexpected transitory fluctuations in rate of country delivery had little or no price effect, whereas the more sustained and largely predictable changes had a measurable effect.

At an earlier point it was noted that increases in the rate of country delivery early in the marketing season were associated with a declining tendency in the Winnipeg price, relative to Liverpool, and that this declining tendency in the Winnipeg price persisted for a short time after the rate of delivery had started to decrease again; and with that further decrease in the rate of country marketing there was no associated tendency for recovery in the Winnipeg price. These tendencies seemed to accord poorly with the supposition that the price effects were consequences of changes in hedging pressure. It was suggested that they might be explained better on the supposition that the price changes arose from conditions in the export market (pp. 53, 57). Other evidence there considered pointed in the same direction. The indications now under consideration, that the fluctuations in hedging pressure associated with daily variations in country deliveries during 1922–1932 had no measurable price influence, lend further support to this view.

Turning to the record for the years since 1932, we may consider first the consistent evidence for the three years 1933, 1934, and 1936. In these years, it will be recalled, the indicated price effect of the more sustained changes in rate of delivery was about four times as great as the average for earlier years (p. 57). In these years the day-to-day variations in rate of delivery also were accompanied by measurable changes in the Winnipeg price relative to Liverpool. In each of these three years a deviation of 1 million bushels from the 5-day average in the daily country deliveries was accompanied, on the average, by a price deviation of about .3 to .6 of a cent; and a change of 1 million bushels in the averages from one 5-day period to the next was accompanied, on the average, by a price change of about 1 cent. These latter tendencies were strong and uniform enough to be observable in a simple graphic record of the data, without the assistance of averages or other analytical devices (Chart 8).

According to the reasoning presented earlier (p. 58) it seems necessary to account for the response of price to day-to-day fluctuations in deliveries in the years 1933–1936 on the basis of effects produced through the mechanism

of hedging. Apparently the Winnipeg market in these years was sensitive to influence from variations in hedging pressure, whereas in earlier years it had shown striking ability to absorb such variations without measurable deflection of the price. As regards the tendency for price to respond to sustained changes in rate of delivery, the increased strength of this tendency in these four years over earlier years may be accounted for wholly on the ground of such a newly developed sensitiveness of the market to variations in hedging pressure. Apparently, then, explanation of the observed facts must be sought in some change that would render the Winnipeg market more sensitive than before to influence from variations in hedging pressure.

Although the Winnipeg market appears to have been measurably sensitive to fluctuations in hedging pressure in the years 1933 to 1936, the degree of influence was small. The relative importance of the measurable price effect of variations in country deliveries from day to day is indicated by the following coefficients of correlation:[1]

1922	+.15	1930	+.03
1923	+.01	1931	−.05
1924	+.17	1932	+.07
1925	−.13	1933	−.20
1926	−.02	1934	−.17
1927	−.07	1935	−.11
1928	−.06	1936	−.06
1929	+.08		

The small size of these coefficients must not be taken to indicate that the price effects of day-to-day variations in deliveries are negligible in the years in which such effects are indicated. The coefficients are small partly because the price effects can be measured only roughly. Futures prices recorded in eighths of a cent provide from most standpoints a

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[1] Specifically, these are coefficients of correlation between deviations of the daily data from their corresponding 5-day averages, in contrast to the coefficients on p. 58, which measure the correlation between changes from one 5-day average to the next. For the present computation it would have been preferable perhaps to use deviations from a moving average or from some smooth fitted trend line, but use of such a method would have increased greatly the labor of computation without significantly improving the results.

very precise registration of price; but from the standpoint of reflecting the small price effects of day-to-day variations in country deliveries, they afford only a rough measure. The price spreads are even more crudely measured than the prices, for the price quotations at Winnipeg and at Liverpool are not precisely simultaneous.

With these reservations, it may be noted that the largest coefficient (−.20) has a square of .04, or about $\frac{1}{25}$. This may be taken to mean that at its maximum the indicated price effect of day-to-day variations in country deliveries is such that it would normally require twenty-four other independent influences of equal importance to account for the total observed effect.

If these results are to be interpreted in terms of effects of variations in hedging pressure, account must be taken also of the fact that the statistics of deliveries do not precisely reflect variations in hedging pressure. Some of the wheat delivered to elevators is not sold by the farmer until after the day of delivery. The elevator hedges only the wheat purchased. If statistics were available on daily hedging sales they might be used to compute specifically the average price effect of day-to-day variations in hedging pressure. The indicated price effect per million bushels change in hedge sales would doubtless be somewhat larger, on the average, than the indicated price effect per million bushels change in country deliveries.

POSSIBLE CAUSES OF CHANGING SENSITIVENESS OF PRICES

During the fifteen years covered by the data a number of changes occurred such as might have affected the sensitiveness of Winnipeg prices to variations in the rate of country delivery of wheat. Co-operative pooling was established by farmer's organizations, reducing by about half the amount of the wheat deliveries to be hedged; and then after seven years the pooling was almost wholly abandoned. Over certain periods, efforts were made by the Central Selling Agency of the Co-operatives to "stabilize" prices. In two years the operation of the futures market was interfered with through temporary prohibi-

tion of trading in futures at prices below certain fixed limits. In two years wheat boards sponsored by the Dominion government were in operation.

Among these developments, the only one which coincided with the major change in apparent sensitiveness of price to variations in rate of marketing was the outright interference with the operation of the futures market. Late on July 31, 1933 the directors of the Chicago Board of Trade established regulations providing that during August 1–15 there should be no transactions in any grain or provision futures in Chicago at prices below those at the close on that day. Wheat prices at both Chicago and Winnipeg recovered sharply in response, but declined again as the end of the period of restriction drew near. After the close of the market on August 11 the directors of the Chicago Board of Trade announced that the minimum price restriction would not be continued after August 15. Immediately prices of Chicago wheat futures fell to the minimum levels and remained there through August 15, while Winnipeg prices, not thus limited, declined more.[1]

It was in these circumstances that a fixed minimum was first set on Winnipeg futures prices, just before the Chicago minimum was

removed. The Winnipeg minima were the closing prices on August 14. Although prices at Winnipeg never rose much above these minimum limits while they were in force, prices at other markets held up well, and on September 14 the limits were removed at Winnipeg.[2] The removal of the minima was followed by a gradual price decline of about 3 cents during the day, from which prices recovered two days later.

During August 15—September 13 while Winnipeg prices remained at or fractionally above the fixed minima they did not, of course, respond to fluctuations in the rate of country delivery of wheat. The indication given by the coefficient for 1933 in the tabulation on page 59 that the Winnipeg price was sensitive to day-to-day variations in country deliveries rests entirely on price responses after September 13. Using only the data for September 14—December 1, the coefficient is -1.22 (instead of $-.58$).[3]

It is reasonable to suppose that the circumstances which led to interference with the free operation of the market may have raised fears of further interference, and that these fears may have restricted trading and left the market abnormally sensitive to hedging pressure after the price limits were removed. It is not possible to support this supposition even to the extent of showing that the volume of trading in Winnipeg futures remained abnormally small after the price limits were removed, since the Winnipeg Grain Exchange makes public no information on the volume and types of trading executed on the exchange. The supposition, therefore, remains a mere surmise.

In the autumn of 1934 the establishment of minimum prices was again proposed and on November 1 such price limits were placed in effect.[4] The fear of such restriction may have curtailed trading before November 1 and left the market sensitive to variations in hedging pressure. The grounds for supposing that the volume of trading was curtailed after November 1 are even stronger. When the minimum price limits were placed in effect on this occasion, prices promptly advanced to several cents above the minimum limits and thereafter fluctuated through a range of sev-

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[1] Other developments related to this episode have been summarized in WHEAT STUDIES, September 1933, IX, 370–72, and January 1934, X, 166–68.

[2] The limits were removed by vote of members of the exchange on the trading floor ten minutes after the market opened (*Grain Trade News,* Winnipeg, Sept. 14, 1933).

[3] The fact that Winnipeg price response is measured in terms of change in the Winnipeg–Liverpool spread permits the coefficient to be affected, in a period of substantially fixed Winnipeg price, by more or less accidental correspondence between variations in country deliveries and variations in the Liverpool price. In day-to-day variations during about 25 market days, purely accidental correspondence cannot be important; but among only five changes between 5-day periods the effect of accidental correspondence may be considerable. It thus occurs that the coefficient reflecting price response to sustained changes in deliveries is -8.8 for September 14—December 1 as compared with the coefficient of -10.5 for August 1—December 1.

[4] WHEAT STUDIES, December 1935, XII, 149. The regulation imposing the limits was adopted late on October 31 at the request of the government (*Grain Trade News,* Winnipeg, Nov. 1, 1934).

eral cents. Consequently it was possible for the price to reflect effects of day-to-day variations in country deliveries even after the price limits were imposed.

If interference with the market did curtail trading and render the market sensitive to variations in country deliveries during August–November of 1933 and 1934, as is possible, it is also possible that such an effect may have continued for some time afterward. The suggestion may even be ventured that in 1935 and 1936 the market may still have been suffering from the effects of this interference and of circumstances that bred fear of re-establishment of new market restrictions. Unfortunately statistics are not available to show whether trading was in fact effected in such a way as would have rendered the price unusually sensitive to variations in hedging pressure.

Lacking support which might be available from such statistics, this possible explanation of the apparent sensitiveness of the Winnipeg price in the four years 1933 to 1936 inclusive requires consideration, yet must be viewed with considerable skepticism. The influences taken into account in this suggested explanation would certainly tend in some degree to produce effects of the sort observed, but it is by no means clear that they are adequate to explain the amount of effect observed. The suggestion deserves serious consideration chiefly because no reasonable alternative explanation has been found.

In contrast to these measures of price regulation, which seem to have had effects more far-reaching than might have been expected, stands another set of influences which seem to have failed to produce effects which were clearly to have been expected. Establishment of the "pool" system of co-operative marketing served to remove as a factor in hedging pressure about half of the wheat delivered in Western Canada during the seven years, 1924–25 to 1930–31. It seems reasonable to suppose that during these seven years the price effect of a change of 1 million bushels in total country deliveries should have been about half as great as the price effect of an equal change in total deliveries in the immediately preceding and following years, when the deliveries went

chiefly to elevators which practiced systematic hedging.

The proportion of the total deliveries during September–December which went to the three provincial pools, according to available information, varied from 39 per cent in 1924 to 56 per cent in 1929. The quantities (in million bushels) delivered during September–December, and the percentages, are given as follows:[1]

Year	Deliveries in four months		Percentage to pools
	Total	To pools	
1924	166.2	64.7	39.0
1925	283.8	153.5	54.1
1926	264.7	121.3	45.8
1927	286.9	140.8	49.1
1928	391.4	199.7	51.0
1929	192.5	108.0	56.1

In addition, a negligibly small proportion of the deliveries in 1923 went to the Alberta pool, which was the only one operating in that year; and perhaps close to 50 per cent of deliveries in 1930 went to the three provincial pools. After 1930–31 the pool organizations operated chiefly on a basis of direct purchase, with all purchases promptly hedged.[2] Nevertheless, the price effect per 1 million bushel change in daily deliveries was not measurably different in the four years 1921, 1922, 1931, and 1932 than in the intervening seven years, with the possible exception of 1928. Inasmuch as the indicated price effect of day-to-day variations in deliveries prior to 1933 was nil, this comparison is significant only as regards the effect of sustained changes (p. 56).

Attempts at wheat price stabilization under the sponsorship of the Dominion government were begun in 1931. The facts have been concisely stated by the President of the Manitoba Pool Elevators Limited as follows: "On January 20th, 1931, in an endeavor to prevent the demoralization of Canadian grain markets,

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[1] Summarized from a table in *Submissions by Wheat Pool Organization of Western Canada to Royal Grain Inquiry Commission* at Calgary and Regina, April–May 1937, p. 23.

[2] The total quantities of wheat handled on the pooling plan by the three provincial pool organizations were only 3.0 million bushels in 1931–32; 12.6 million in 1932–33; 1.7 million in 1933–34; and 2.4 million in 1934–35 (*ibid.*, p. 14).

the Dominion Government guaranteed the lending banks against loss in connection with the 1930 Pool grain, and some months later Mr. McFarland, acting on behalf of the Canadian Co-operative Wheat Producers Limited [the Central Selling Agency], commenced to use Central as a Government stabilization agency."[1] If these stabilization operations had extended only through 1932, it might perhaps be held that they served to offset the effects of abandonment of contract pooling in 1931, and thus prevented emergence of increased price effects from the increased percentage of deliveries hedged after pooling

[1] Mr. Paul F. Bredt, in *Submissions* . . . . , cited above, pp. 27–28.

[2] It is quite another question whether the stabilization efforts held Canadian and world prices of wheat at somewhat higher levels tnan would otherwise have been registered. This remains a matter of opinion. It may be shown that some of the arguments used to support the contention that the stabilization efforts had this effect are ill-founded. It may be shown also that some of the contrary arguments are ill-founded. But as yet the question of the effect of the stabilization efforts on the price level remains without conclusive answer, and it may be doubted whether conclusive evidence can be adduced. Perhaps it is better from the standpoint of determination of future policies in Canada that attention be turned to other suggestions for ameliorating the position of wheat growers. There may be some such which could be shown to have clear promise of usefulness. Those who supported the stabilization efforts and those who participated in them would of course be gratified by evidence that the efforts were beneficial; but they may well be content with receiving recognition that at the outset there were reasonable grounds for hoping that the efforts would prove useful, and that they were made with a sincere and worthy purpose. Such recognition may be given without hesitation.

[3] Estimates which we made from incomplete data (WHEAT STUDIES, December 1930, VII, 142) may now be replaced by the following authoritative statistics on Pool holdings and marketings, in million bushels and in percentages:

July 31	Canadian carryover in Canada and U.S.	Pool wheat carryover	Pool percentage of carryover	Percentage of crop marketed by Pool
1925	30.7	12.2	39.74	38.41
1926	40.1	21.3	53.12	53.15
1927	55.6	38.6	69.42	53.15
1928	91.1	42.8	46.98	52.51
1929	127.2	84.6	66.51	52.15
1930	126.8	64.6	50.95	51.23

These data are reproduced from p. 18 of the *Submissions* cited.

[4] This board was composed of John I. McFarland, chief commissioner; David L. Smith, assistant commissioner; Henry C. Grant, commissioner.

was generally discontinued. In view of the fact that the government-sponsored attempts at stabilization continued in 1933 and 1934, when the apparent price effects of variations in country deliveries reached their maximum, however, it seems doubtful whether in this respect the stabilization efforts were of much effect.[2]

Perhaps most of the private traders whose operations would normally have absorbed the variations in hedging pressure felt that they could not safely try to operate alongside the powerful government-sponsored agency, and withdrew. The attempt of the Central Selling Agency merely to supplement the operations of private traders may have led of necessity to its taking over practically the entire burden of absorbing variations in hedging.

There is some evidence, nevertheless, that certain other efforts at stabilization of prices were not without effect. In 1928 and again in 1935 Winnipeg prices on the average seem to have been unaffected, in their relation to Liverpool, by the more sustained changes in the rate of country deliveries. They may even have tended sometimes to change in the same direction that the deliveries changed instead of inversely, as would be expected (see the coefficients on p. 56). It was in 1928–29 that the opinion first became prevalent that the Central Selling Agency of the pools was supporting Canadian prices. At the end of 1928–29 the pools were holding rather more than their normal share of the Canadian wheat carryover.[3] Our calculations indicate that if the Pool did attempt to stabilize prices in 1928 its efforts were quite successful in counteracting the effects of the more sustained variations in hedging pressure.

During August – November of 1935 the newly established wheat board was operating with its original personnel.[4] Since much wheat was delivered direct to the board, hedging pressure was to this extent removed. Trade opinion was that the board received about half the new-crop wheat marketed from September 25 to October 26, and practically all of the wheat marketed later. (About 35 per cent of the season's marketings were completed before September 25.) Although the board was not specifically empowered to trade

in futures, it became a large holder of futures through exchange in the normal course of making cash sales, and may have undertaken to time its disposition of these holdings of futures with a view to counteracting effects of variations in hedging pressure. The policy of the first wheat board with respect to cash sales also may have been directed in part toward a similar end. If the board used its powers with a view to counteracting the effects of variations in hedging pressure, its efforts succeeded well.

Although the usual effects of sustained changes in rate of country delivery seem to have been suppressed in 1935 as in 1928, the price effects of day-to-day variations in country deliveries seem to have been about the same in 1935 as in 1933, 1934, and 1936. It is not unreasonable that such should have been the case. As has been noted above (p. 59), the effects of these day-to-day variations, even when most extreme, have tended to be always very small and commonly imperceptible. The absence of measurable price effects from these day-to-day variations in deliveries prior to 1933 reflects an extraordinary

degree of perfection in the operation of the futures market under normal conditions. For the wheat board to have prevented the appearance of such small effects as are indicated in 1935 and 1936 would have required a skill and delicacy of control beyond that reasonably to have been expected.

It may well be doubted whether any broad conclusions are warranted from such tenuous connections as we are able to establish between attendant circumstances and the observed characteristics of price response to variations in rate of country delivery. The evidence, such as it is, seems nevertheless to support three generalizations of considerable interest: as regards the absorption of hedging pressure, the Winnipeg futures market, operating without restraint, seems to have worked very well; interference that goes so far as to threaten price fixing may measurably reduce the efficiency of the futures market; and attempts by a powerful central agency to counteract variations in hedging pressure may work well or may work poorly, depending presumably on the knowledge and skill with which they are directed.

*The statistical computations for this study were made chiefly
by Adelaide M. Hobe and the charts by P. Stanley King.*

APPENDIX TABLES

TABLE I.—AVERAGE MONTHLY PRICES OF CANADIAN AND OTHER WHEATS IN BRITISH AND DOMESTIC MARKETS, AND AVERAGE PRICE SPREADS*

(U.S. cents per bushel)

Month	British prices[a]				Domestic prices[b]		Price spread	
	No. 1 Manitoba	No. 3 Manitoba	Australian[c]	Domestic (Gazette)	Winnipeg No. 1 Man.	Melbourne	No. 1 Manitoba	Australian[d]
Aug.	132.4	123.5	125.6(122.9)	119.6	115.6	100.0	16.8	22.9
Sept.	126.0	118.2	122.6(119.8)	105.3	106.7	98.5	19.3	21.3
Oct.	124.6	117.2	119.8(118.7)	105.1	103.9	96.8	20.7	21.9
Nov.	125.2	117.1	119.9(119.8)	106.6	104.2	95.9	21.0	23.9
Dec.	128.1	120.2	122.9(122.3)	106.4	103.8	95.5	24.3	26.8
Jan.	129.0	121.8	122.4(121.5)	107.7	106.1	95.3	22.9	26.2
Feb.	131.3	122.8	121.2(119.0)	107.4	108.1	93.4	23.2	25.6
Mar.	128.9	119.8	119.8(117.6)	107.4	107.4	92.4	21.5	25.2
Apr.	128.0	119.6	121.3(119.3)	109.5	108.9	94.2	19.1	25.1
May	128.1	120.2	123.2(120.8)	115.8	110.5	95.8	17.6	25.0
June	125.4	117.3	120.4(118.8)	117.6	108.9	94.3	16.5	24.5
July	131.2	122.8	122.2(120.4)	119.4	114.8	96.6	16.4	23.8
Aug.	130.1	122.8	123.8(121.0)	117.7	112.6	98.7	17.5	22.3

* Sixteen-year averages, 1921–22 to 1936–37, except as otherwise noted.

[a] For imported wheats, sellers quotations, c.i.f. parcels on Tuesdays, from Broomhall's *Corn Trade News*, with missing quotations supplied by estimation (see p. 45); for domestic wheat, weekly averages, from the *Agricultural Market Report;* conversions at current rates of exchange on cable transfers.

[b] Winnipeg prices from the *Canadian Grain Trade Year Book* and the *Monthly Review of the Wheat Situation.* Mel-

bourne prices through July 1929 furnished by John Darling and Son, Melbourne, later months from *Wheat and Grain Review.*

[c] Figures in parentheses are 15-year averages, 1922–23 to 1936–37.

[d] Fifteen-year averages, 1922–23 to 1936–37.

TABLE II.—ANNUAL AND SEMI-ANNUAL AVERAGE PRICES OF CANADIAN AND OTHER WHEATS IN BRITISH MARKETS, 1921–22 to 1936–37*

(U.S. cents per bushel)

Crop year	Annual (August–July) averages				August–January average				February–July average			
	No. 1 Man.	No. 3 Man.	Aus- tralian	Domestic (Gazette)	No. 1 Man.	No. 3 Man.	Aus- tralian	Domestic (Gazette)	No. 1 Man.	No. 3 Man.	Aus- tralian	Domestic (Gazette)
1921–22 ...	154.7	139.6	147.2	136.3	147.4	132.0	142.5	127.8	161.9	147.1	152.0	144.8
1922–23 ...	137.2	130.8	145.2	124.8	138.8	131.3	145.6	121.3	135.7	130.2	144.8	128.3
1923–24 ...	126.8	118.6	128.0	120.8	124.3	116.0	125.2	112.8	129.4	121.1	130.9	128.8
1924–25 ...	190.4	180.9	181.0	159.6	185.6	176.1	180.0	154.5	195.2	185.6	181.9	164.7
1925–26 ...	176.4	168.6	176.0	158.2	173.2	168.1	175.4	150.0	179.5	169.2	176.5	166.3
1926–27 ...	173.0	163.5	167.5	157.1	171.2	163.9	169.3	157.0	174.8	163.0	165.6	157.2
1927–28 ...	166.9	153.5	159.8	137.2	170.0	154.5	159.7	138.8	163.8	152.5	159.8	135.7
1928–29 ...	147.2	137.5	139.6	127.1	144.6	133.8	141.2	125.7	149.7	141.1	137.9	128.5
1929–30 ...	143.3	137.3	132.6	120.4	161.4	154.6	144.2	129.2	125.1	120.0	121.0	111.7
1930–31 ...	82.4	77.0	77.3	81.1	88.3	85.0	88.6	89.2	76.4	69.0	65.9	73.0
1931–32 ...	68.1	61.4	60.6	61.4	69.3	61.5	61.2	63.4	66.9	61.3	60.0	59.4
1932–33 ...	60.7	57.7	57.8	55.5	55.7	53.4	55.6	50.9	65.6	62.0	60.0	60.2
1933–34 ...	83.2	76.1	70.7	63.6	78.7	73.3	70.6	61.9	87.8	79.0	70.9	65.4
1934–35 ...	97.3	87.8	79.1	66.3	97.7	89.1	79.4	66.1	96.9	86.4	78.8	66.6
1935–36 ...	101.2	94.8	92.9	81.0	103.1	96.2	90.9	73.7	99.2	93.4	95.0	88.4
1936–37 ...	142.4	135.9	133.2	119.6	131.5	126.0	125.5	112.6	153.2	145.8	140.8	126.6
Average 1921–37 ...	128.2	120.1	121.8	110.6	127.6	119.7	122.2	108.4	128.8	120.4	121.4	112.8

* Sources as for Table I.

TABLE III.—CANADIAN, RUSSIAN, AND WORLD NET EXPORTS OF WHEAT AND FLOUR, ROUGHLY EXCLUDING EXPORTS TO THE ORIENT, 1921–22 TO 1936–37*

(*Million bushels; per cent*)

August–July	Cana-dian	Russian	Total	"World" total	Ratio	August–July	Cana-dian	Russian	Total	"World" total	Ratio
1921–22	181.8	.0	181.8	652	27.9	1929–30	173.5	8.7	182.2	593	30.7
1922–23	272.7	.6	273.3	683	40.0	1930–31	241.3	111.8	353.1	762	46.3
1923–24	327.3	21.4	348.7	753	46.3	1931–32	193.7	71.8	265.5	703	37.8
1924–25	187.5	.4	187.9	756	24.9	1932–33	250.1	19.7	269.8	554	48.7
1925–26	297.4	26.6	324.0	654	49.5	1933–34	188.0	33.8	221.8	507	43.7
1926–27	277.6	49.3	326.9	820	39.9	1934–35	160.0	4.3	164.3	488	33.7
1927–28	315.7	5.4	321.1	787	40.8	1935–36	248.6	29.7	278.3	496	56.1
1928–29	362.2	.0	362.2	855	42.4	1936–37ᵃ ...	190.3	4.8	195.1	594	32.8

* Canadian August–July gross exports of wheat and flour less July–June exports to China, Hong Kong, and Japan, from official sources; Russian July–June gross exports of wheat and flour from *Foreign Agriculture*, January 1937, I, 28; and Food Research Institute estimates of world net exports less net imports of China, Manchukuo, Japan, and India.

ᵃ Preliminary.

TABLE IV.—BRITISH IMPORTS OF WHEAT AND FLOUR BY PRINCIPAL COUNTRIES OF ORIGIN, 1921–22 to 1936–37*

(*Million bushels*)

August–July	Canada	United States	U.S. exports to U.K.ᵃ	Canada adjustedᵇ	Russiaᶜ	Australia	Argentina	Other countries	Total	Percentage from Canada and Russia
1921–22....	51.4	87.3	63.7	75.0	.0	47.3	27.4	2.8	216.2	34.7
1922–23....	68.6	79.5	37.2	110.9	.0	14.0	34.6	16.4	213.1	52.0
1923–24....	78.5	63.5	23.6	118.4	1.7	23.1	47.7	21.2	235.7	51.0
1924–25....	72.8	63.7	50.1	86.4	.0	33.0	30.1	30.7	230.3	37.5
1925–26....	80.5	53.0	20.3	110.7	2.4	24.7	29.7	14.6	204.9	55.2
1926–27....	76.4	76.6	47.4	103.6	7.9	26.0	32.3	8.8	228.0	48.9
1927–28....	80.5	63.4	42.3	94.7	1.0	25.2	44.0	12.2	226.3	42.3
1928–29....	81.2	43.4	21.4	97.7	.1	26.1	55.0	9.0	214.8	45.5
1929–30....	53.2	49.2	31.2	68.9	1.8	25.8	69.6	20.2	219.8	32.2
1930–31....	64.0	36.7	24.3	74.2	48.8	39.8	32.2	16.1	237.6	51.8
1931–32....	69.3	24.4	18.7	70.4	40.5	59.3	48.8	13.9	256.2	43.3
1932–33....	114.0	2.6	2.0	....	4.0	56.0	34.2	16.0	226.8	51.7
1933–34....	80.6	.4	1.3	....	14.7	48.1	54.7	28.8	227.3	41.9
1934–35....	76.0	1.0	.6	....	.0	41.6	61.0	30.4	210.0	36.2
1935–36....	105.9	.7	.2	....	13.2	50.2	12.5	30.4	212.8	56.0
1936–37....	97.2	.3	.4	....	.0	47.2	30.5	31.9	207.1	46.9

* Computed from data reported in *Accounts Relating to Trade and Navigation* of the United Kingdom, except as noted below. Flour converted to equivalent bushels of wheat at 70 per cent extraction rate.

ᵃ July–June data from *Monthly Summary of Foreign Commerce.*

ᵇ Through 1924–25 obtained by deducting United States July–June exports to the United Kingdom from the total reported imports from Canada and the United States for August–July years. For 1925–26 through 1931–32, grain as reported by Special Committee on the Marketing of Wheat

and Other Grains in *Minutes of Proceedings and Evidence,* No. 7, Apr. 30, 1936, p. 237; plus flour as reported in *Accounts Relating to Trade and Navigation* of the United Kingdom.

ᶜ Russia not separately reported in *Accounts Relating to Trade and Navigation* of the United Kingdom, prior to 1930–31; earlier data from Broomhall's *Corn Trade Year Books.*

TABLE V.—ANNUAL AND SEMI-ANNUAL AVERAGE PRICES OF "HARD" AND OF "SOFT" WHEATS IN BRITISH MARKETS, AND RATIOS, 1921–22 to 1936–37*

(U.S. cents per bushel; percentages)

Crop year	August–July		August–January		February–July		Ratio, Hard to Soft		
	Hard	Soft	Hard	Soft	Hard	Soft	Aug.–July	Aug.–Jan.	Feb.–July
1921–22.....	147.1	141.8	139.7	135.2	154.5	148.4	103.7	103.4	104.1
1922–23.....	134.0	135.0	135.0	133.4	133.0	136.6	99.3	101.2	97.4
1923–24.....	122.7	124.4	120.1	119.0	125.2	129.8	98.6	101.0	96.4
1924–25.....	185.6	170.3	180.8	167.2	190.4	173.3	109.0	108.1	109.9
1925–26.....	172.5	167.1	170.6	162.7	174.4	171.4	103.2	104.9	101.7
1926–27.....	168.2	162.3	167.6	163.2	168.9	161.4	103.6	102.7	104.6
1927–28.....	160.2	148.5	162.2	149.2	158.2	147.8	107.9	108.7	107.0
1928–29.....	142.3	133.3	139.2	133.4	145.4	133.2	106.8	104.3	109.2
1929–30.....	140.3	126.5	158.0	136.7	122.6	116.3	110.9	115.6	105.3
1930–31.....	79.7	79.2	86.6	88.9	72.7	69.5	100.6	97.5	104.7
1931–32.....	64.8	61.0	65.4	62.3	64.1	59.7	106.2	105.0	107.4
1932–33.....	59.2	56.6	54.6	53.2	63.8	60.1	104.6	102.4	106.2
1933–34.....	79.7	67.2	76.0	66.2	83.4	68.2	118.6	114.7	122.4
1934–35.....	92.5	72.7	93.4	72.8	91.6	72.2	127.2	128.4	126.1
1935–36.....	98.0	87.0	99.6	82.3	96.3	91.7	112.6	121.1	105.0
1936–37.....	139.2	126.4	128.8	119.0	149.5	133.7	110.1	108.1	111.8
Average 1921–37.....	124.2	116.2	123.6	115.3	124.6	117.1	106.9ᵃ	107.2ᵃ	106.4ᵃ

* Computed from data in Table II, combining prices of No. 1 and No. 2 Manitoba to represent hard wheats, and of Australian and British domestic to represent soft wheats.

ᵃ Ratio of 16-year averages.