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OFFICIAL AND UNOFFICIAL STATISTICS OF INTERNATIONAL TRADE IN WHEAT AND FLOUR



THE statistics most widely employed to measure fluctuations in the volume of international trade in wheat and flour are unofficial statistics published in Broomhall's *Corn Trade News*, and official statistics of net exports. This study compares these series, both as to annual crop-year data and as to average monthly data.

Crop-year statistics of world net exports overseas have exceeded Broomhall's shipments by 36 million bushels a year, or approximately 5 per cent, on the average, over the nine years 1921-22 to 1929-30. There appears to be little likelihood of double counting on the part of customs officials; rather, the discrepancy seems to arise principally because Broomhall's figures have not taken account of some wheat and flour moving from North America and of some moving from Hungary and Jugo-Slavia. The North American situation is complicated by the crisscross movement of wheat on the Great Lakes. From Hungary and Jugo-Slavia much wheat is exported over land frontiers, at scattered points, a circumstance which places difficulties in the way of unofficial statistical agents. On the whole, for the annual volume of trade, it is probable that the net export series is the more accurate of the two series considered.

On the other hand, it seems clear that Broomhall's shipments provide the best available series for the study of month-to-month fluctuations. For Argentina and Australia average monthly net exports and shipments coincide fairly closely. Broomhall's data seem to represent fairly well the course of the movement from North America, whereas available official statistics are not so compiled as to provide a trustworthy picture. Probably neither series adequately measures the month-to-month outflow of wheat and flour from minor exporting countries. Too much significance should not be attached to minor month-to-month changes in the total volume of trade as shown by Broomhall's data; but larger changes presumably reflect a real alteration in the volume of trade, and the general drift over a period of months is certain to be indicated by Broomhall's shipments.

STANFORD UNIVERSITY, CALIFORNIA

March 1931

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

OF THE

FOOD RESEARCH INSTITUTE

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The Food Research Institute was established at Stanford University in 1921 jointly by the Carnegie Corporation of New York and the Trustees of Leland Stanford Junior University, for research in the production, distribution, and consumption of food.

OFFICIAL AND UNOFFICIAL STATISTICS OF INTERNATIONAL TRADE IN WHEAT AND FLOUR

A subject toward which little research has been directed is that of short-time fluctuations in the movement of wheat and flour in international trade. A realistic appraisal of the world wheat situation at any particular time, however, needs to include, at least as background, certain facts regarding the way in which exports from and imports into various countries have changed from month to month in accord with changes in available stocks, in prices, or in other circumstances that may affect the flow of wheat in international trade.

Before one undertakes to study short-time fluctuations in international trade, however, it is desirable to fix upon some statistical series or other that appears to be appropriate to the purpose, and to ascertain in what respects (and so far as possible, why) one statistical series differs from another. The present inquiry constitutes a comparison of export statistics, in total, from Argentina, from Australia, from North America, and from other countries. The series which involve most of the comparisons are official statistics of exports, usually net exports, and unofficial statistics as published in Broomhall's *Corn Trade News*. These are, on the whole, the series most familiar to grain traders and to students of the world wheat situation.

Measurement of the annual total volume of international trade in wheat and flour

is not so simple a matter as it might seem. We have frequently had occasion in *WHEAT STUDIES* to point out that differences appear in the magnitude of Broomhall's total annual shipments as compared with summations of net exports from the net exporting countries, and that the differences vary considerably in size from crop year to crop year. The questions naturally arise, why do these differences appear, and which of the series seems to be the more accurate. One may apply the questions both to data on

annual exports and shipments, and to data on monthly shipments and exports. The present inquiry centers about these questions. Neither seems susceptible of an altogether satisfactory answer; yet some interesting and significant facts emerge from the comparisons here undertaken.

The comparisons are mostly of two sorts: first, crop-year (August-July) totals of Broomhall's shipments on the one hand, and of net exports on the other; second, the same data arranged as average shipments and net exports in August and each of the succeeding eleven months. The data both for crop years and for monthly averages cover the nine-year period, August 1921 to July 1930. Data for single months are not specifically considered in the present inquiry, but are reserved for discussion in subsequent papers.

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I. TOTAL NET EXPORTS AND SHIPMENTS

DIVERSE MEASURES OF THE VOLUME OF TRADE

Theoretically, the annual volume of international trade in wheat and flour might be measured in several ways. Given the appropriate statistical data, one might add together the gross exports of a list of coun-

tries; or, conversely, the gross imports of a considerably longer list. Similarly, net exports or net imports might be taken. It happens that gross or net imports are not recorded for many countries; hence, summations of net or gross imports, purporting to represent the total volume of trade, are

seldom or never to be encountered. The data most readily susceptible of compilation are gross exports of the exporting countries, net exports of the net exporting countries, and overseas shipments (Broomhall's) from the prominent exporters, whether gross or net.

Of these three series, the gross exports would be the largest. Many countries which are net importers of wheat and flour combined may nevertheless export each year, or in some years or months, a little wheat and a good deal of flour. Japan, for example, is always a net importer of wheat and flour combined; each year, however, she exports a good deal of flour. This is true of many western European countries. There is also something of a re-export trade. Furthermore, gross exports from the United States and Canada combined would always more or less exceed their combined net exports, principally because of the wheat that is imported into the United States from Canada for domestic consumption and for milling in bond for export as flour. Similarly, combined gross exports from India and Australia would exceed their combined net exports because of the wheat imported into India for domestic consumption from Australia. Of the three, the series of gross exports would be the most difficult to compile, merely because the list of countries that are gross exporters of wheat and flour combined is much longer than the list of solely net exporting countries of wheat and flour combined; moreover, it could never be a complete list because statistics would be lacking for a number of countries. The relatively greater ease of securing original data and of compiling statistics has led to fairly general use, as measures of the volume of international trade in wheat and flour, either of net exports of the net exporting countries, so far as available, or of shipments (usually called "overseas shipments") mostly from the net exporting countries.

It is simply because these two series are at once the most familiar and the most susceptible of statistical manipulation that we here undertake comparisons between them. Other series might serve particular purposes better than either of these. Our object is not to demonstrate which of all pos-

sible series is the best for all purposes, but to ascertain how and why two admittedly useful series differ one from the other, and to determine whether or not one or the other lends itself better to study of month-to-month fluctuations in the total volume of international trade in wheat and flour.

ANNUAL DATA: BROOMHALL'S SHIPMENTS

At the outset it seems desirable to compare briefly annual crop-year totals of Broomhall's shipments as they appear under two different methods of compilation.

As originally reported, shipments appear as weekly data. The data apply principally to overseas shipments; in general, the collection of statistics involves the recording, by agents stationed in various countries, of the amounts of wheat and flour shipped by vessel to foreign destinations from seaboard or from river ports near and leading to seaboard. But Broomhall's shipments do not precisely represent overseas shipments. In the first place, account is not taken of overseas shipments of flour from European countries, either one to the other or to ex-European destinations. In the second place, account seems to have been taken, at least in recent years, of exports from Hungary and Jugo-Slavia that have passed out of these to neighboring countries both by rail and up the Danube by river transport; these are not overseas shipments. Hence, it is improper to describe Broomhall's data strictly as overseas shipments. Nor can they strictly be called overseas shipments from the principal net exporting countries. At times, if a significant outflow of wheat or flour occurs from a country that is normally a net importer, these shipments will be included; this occurred with respect to Germany in 1925-26, and to France in 1929-30. Broomhall's effort is apparently to record the outflow of wheat and flour from all countries where the flow appears to be significant.

In presenting crop-year totals of Broomhall's shipments, one may make totals of weekly shipments as these have been published in the weekly issues of the *Corn Trade News*, or utilize totals that appear in the *Corn Trade Yearbooks*, or make to-

tals of weekly shipments as published for a series of years in the *Corn Trade Yearbooks*, or utilize totals that are printed as cumulative totals in the *Corn Trade News*, or create different totals by attempting to adjust weekly data from one or the other of these sources so as to avoid definition of a crop year as including precisely 52 or precisely 53 weeks.¹ There will be differences, mostly slight, between totals reached by the different methods. If one adds up the shipments reported week by week for 52 weeks in the *Corn Trade News*, he may reach a total different from the cumulative total shown in the fifty-second issue of the *Corn Trade News* for the year in question. In short, there seems to be no single set of crop-year shipments data that one may regard as the final or definitive series.

Table 1 shows three sets of August-July crop-year total shipments. The cumulative totals, as published at the close of each crop year in the *Corn Trade News*, tend to exceed very slightly the summations of weekly data published in the *Corn Trade Yearbooks*, though the totals are identical for four crop years. Since a crop year never includes precisely 52 or precisely 53 weeks, neither the cumulative nor the *Yearbook* totals represent precisely the shipments by crop years. The series called "adjusted *Yearbook* totals" represents a sort of correction. It was compiled as follows. The weekly shipments as published in the *Yearbooks* were adjusted to form monthly shipments by taking as the shipments made in any month the shipments for such weeks as fell within the month, and by adding to this quantity (for example), on the one hand, four-sevenths of the shipments made in a week, four days of which fell in the month in question, three days of which fell in the preceding month; on the other hand,

five-sevenths of the shipments made in a week, five days of which fell in the month in question, two days of which fell in the succeeding month. So far as concerns crop-year totals, identical results would be obtained merely by adjusting shipments in the weeks that overlap between crop years; the method described above was employed

TABLE 1.—BROOMHALL'S SHIPMENTS BY CROP-YEAR TOTALS AS DERIVED FROM DIFFERENT SOURCES AND BY DIFFERENT METHODS, FROM 1921-22*

(Million bushels)

August-July	Cumulative totals	Yearbook totals	Adjusted Yearbook totals
1921-22.....	647.2	642.5	643.6
1922-23.....	676.4	675.2	675.9
1923-24.....	775.3 ^a	773.3 ^a	766.3
1924-25.....	715.2	715.2	706.0
1925-26.....	667.6	667.6	668.7
1926-27.....	817.6	814.4	815.8
1927-28.....	792.8	792.8	796.6
1928-29.....	927.6 ^a	928.1 ^a	918.2
1929-30.....	612.9	612.9 ^b	614.0 ^b
Average.....	737.0	735.8	733.9

* Data direct or computed from *Corn Trade News* and *Corn Trade Yearbooks*. The cumulative totals are those published in the last issue of the *Corn Trade News* for each crop year. The *Yearbook* totals are those shown in the *Yearbooks* as summations of weekly data (see issue for 1930, p. 49). The adjusted *Yearbook* totals are derived as described in the accompanying text. Conversions from quarters to bushels at 8 bushels per quarter.

^a Fifty-three weeks.

^b Based on data for 30 weeks from *Corn Trade Yearbook*, 1930; 22 weeks from *Corn Trade News*.

because shipments adjusted to a monthly basis appear to be useful. The adjusted *Yearbook* totals do not precisely represent the shipments made in any crop year, if only because the assumption is inexact that a seventh of a week's shipments is made each day in the week. Even if the adjustment were a precise one, the totals could not precisely represent a year's shipments: total shipments designated as made in a particular week are not in fact made within that week, for the week ends on different days as regards shipments from the several sources.² In short, it is not possible to secure from Broomhall's data a precise record of shipments made within a week, or within a month, or within a crop year. This is not to say, however, that the data are not sufficiently accurate for practical

¹ A year, of course, includes either 52 1/7 or 52 2/7 weeks.

² One may judge of this by the manner in which Broomhall's shipments are published in the *Chicago Daily Trade Bulletin*. On Thursday one usually finds a report on shipments from Black Sea ports. On Friday the Argentine and Australian shipments are reported. On Saturday there is often a statement of the total week's shipments, excluding North America. On Monday or Tuesday a complete tabulation appears; but these figures will not agree precisely with totals printed in the Tuesday (Liverpool) issue of the *Corn Trade News*.

purposes. The fact is significant chiefly because it indicates that precise concordance between crop-year shipments and crop-year net exports could not be expected to obtain even as regards an exporting country whose net exports and overseas shipments ought to be in accord on all other grounds (a circumstance that never appears).

If one compares the adjusted *Yearbook* totals with the unadjusted, it appears that the effect of adjustment in general, as would be expected, is to increase the crop-year totals in years when shipments for 52 weeks were included in the unadjusted totals and to decrease them in years when shipments for 53 weeks were included in the unadjusted totals. In 1924-25, however, the adjusted total of 706.0 million bushels fell 9.2 million below the unadjusted total of 715.2 million for 52 weeks. In that year Broomhall included in the unadjusted total some 11.3 million bushels of wheat and flour described as "frontier shipments" from Hungary and Jugo-Slavia, details of which were not available by weeks. It is largely for this reason that the unadjusted *Yearbook* totals, if added for the period 1921-22 to 1929-30, exceed the adjusted totals by 17 million bushels. That this excess is larger than 11.3 million bushels represents the fact that the unadjusted series includes shipments for 2,926 days, while the adjusted (so far as the adjustment is precise) includes shipments for 2,922 days, or four days less.

Since monthly statistics of shipments are those with which the present study is largely concerned, the adjusted *Yearbook* series are those employed in subsequent comparisons of shipments and net exports. Hereafter, the adjusted series, whether monthly or by crop years, will be referred to simply as shipments.

ANNUAL DATA: TOTAL SHIPMENTS AND TOTAL NET EXPORTS

Next we may contrast shipments with net exports, in terms of crop-year totals.

Official data on net exports might theoretically be compiled by crop-year totals in either of several ways. (1) One might scan the list of countries trading in wheat and

flour over the period, determine from crop-year statistics what countries were net exporting countries in individual years, and for each year add together the net exports of the countries that were net exporters in that year. (2) Using crop-year statistics, one might fix upon a list of countries that were net exporters on the average over the period, add together for each year the net exports of such of these countries as were net exporters in the year in question, and subtract from the total the net imports of such countries on the list as happened to be net importers in the year in question. India, Bulgaria, Algeria, Tunis, and Russia were net exporters on the average over the period 1921-22 to 1929-30, but have been net importers in one crop year or another. (3) Using monthly statistics of net exports, one might determine what countries were net exporters in each month, add together the net exports made in each month, and sum up the monthly totals to reach annual totals. (4) One might determine what countries were net exporters on the average over the period, add together for each month the net exports of such countries as were net exporters in the month in question, and subtract the net imports of the countries (which on the average were net exporters) that were net importers in the month in question, thereafter continuing the monthly totals into crop-year totals. (5) Using monthly statistics, one might sum up net exports made from any country, whether or not a net exporter on the average, and combine the monthly totals into annual totals.

The lack of official monthly net export statistics from such countries as Russia, Morocco, and Chile precludes the possibility of obtaining crop-year totals that are complete or approximately so by any method based on the use of monthly data. A more complete total may be obtained from crop-year statistics, and at the same time a total much easier to calculate. Of the five alternative methods, the first is the most convenient to employ—a summation, for each year, of the net exports from countries that were net exporting countries in that year. The list always includes the United States, Canada, Argentina, Australia, Hungary, Jugo-Slavia, Roumania, Mo-

rocco, and Chile. It includes India, Bulgaria, Russia, Algeria, and Tunis more often than not. Occasionally, it includes Spain and Poland. Crop-year totals of net exports compiled by this method would not necessarily be better totals than those reached by the second method—adding up for each year the net exports of countries that were net exporters on the average, and subtracting the net imports of such countries on the list as happened to be net importers during the year in question.¹ But on the whole, the formation of crop-year total net exports simply by the addition of the net exports of the countries that were net exporters in particular years seems to be the simpler process. And this method seems clearly to yield totals that ought to correspond more closely to Broomhall's total shipments than would be true of total net exports calculated by the second method, though even so the correspondence could not be expected to be strikingly close.

Some estimates and adjustments have to be included in a summation of total net exports, and the total cannot be made complete. Official August–July net import statistics are not available for Russia, Morocco, and Chile. One may employ July–June net exports for Russia, and calendar-year net export statistics for Chile and Morocco can be adjusted roughly to the crop-year basis. But it is impossible to ob-

¹ In passing, it seems desirable to show how total net exports computed under these two alternative methods differ by August–July crop years. The figures are as follows, in million bushels:

Crop Year	Method 1	Method 2
1921–22	701.0	687.2
1922–23	714.0	710.8
1923–24	824.4	824.1
1924–25	770.4	768.2 ^a
1925–26	699.4	694.1
1926–27	849.0	846.4
1927–28	824.9	824.9
1928–29	941.6	917.3
1929–30	623.1	621.5

^a Inexact, because Russia may have imported around 10 million bushels net, but official statistics are not available.

Net exports are the same under the two methods only in 1927–28. On the whole, however, the differences are small, almost negligible. In 1921–22 and 1928–29, when the second method resulted in totals smaller than the first by 13.8 and 24.3 million bushels, respectively, the differences arise wholly from the fact that India was a net importer in those years. The occasional small net exports of Spain and Poland, and the occasional small net imports of Bulgaria, Algeria, and Tunis have very little effect upon the totals.

tain usable series for certain countries that are sometimes or always small net exporters, such as Uruguay, Persia, Irak, Cyprus, Angola, Kenya, and Eritrea; there may be others. Hence, the total net exports shown in Table 2, in contrast with Broomhall's shipments, are not complete; nor are they precisely accurate. They are presumably about as complete as Broomhall's shipments statistics, however.

TABLE 2.—TOTAL NET EXPORTS OF WHEAT AND FLOUR, AND BROOMHALL'S SHIPMENTS, BY CROP YEARS FROM 1921–22*

(Million bushels)

August–July	Net exports	Shipments	Excess of exports over shipments
1921–22	701.0	643.6	57.4
1922–23	714.0	675.9	38.1
1923–24	824.4	766.3	58.1
1924–25	770.4	706.0	64.4
1925–26	699.4	668.7	30.7
1926–27	849.0	815.8	33.2
1927–28	824.9	796.6	28.3
1928–29	941.6	918.2	23.4
1929–30	623.1	614.0	9.1
Average	772.0	733.9	38.3

* Net exports for each year are summations of officially reported net exports (sometimes through the International Institute of Agriculture) of the countries that were net exporters in each year; shipments from the United States to possessions, which are officially reported in a separate category from exports, are included. Exports from Russia are July–June figures except for 1929–30, when Broomhall's shipments, raised to allow for understatements, are used; exports of Chile and Morocco are estimated from calendar-year statistics. Shipments are summations of monthly data derived from weekly figures in the *Corn Trade Yearbook*, 1930, except March–July, 1930, when the weekly data were taken from the *Corn Trade News*.

As Table 2 shows, net exports have exceeded shipments in each of the past nine crop years. To employ rounded figures, the excess of net exports over shipments has averaged nearly 40 million bushels per year, and has ranged from about 10 to about 65 million bushels. On the average, the excess amounts to more than 5 per cent. It is unwise to attempt too precise comparisons: the excess would be a little smaller on the average, and considerably smaller in 1924–25, if Broomhall's cumulative total shipments had been employed rather than the totals given in the table; for particular years the tabulated data cannot be taken as precisely accurate; and needless to say, it is improbable that clerical errors can

have been avoided in the collection of original data, in conversions of tons, pounds, quintals, barrels, or sacks of wheat or flour to bushels of wheat, and in summations.

On general grounds one would expect something of an average excess of net exports over shipments. Data on shipments are gathered promptly, and are made public within a few days; official net export statistics are less rapidly collected and published. The far greater amount of clerical work that goes into the collection and publication of official export statistics leads one to assume that the export statistics ought to be more complete for most countries. Further than this, officials in some countries at least would seem to be in a better position than a private organization would be to secure a complete account of those countries' exports. Some wheat moves from ports that are on the whole insignificant in the wheat and flour trade; and one may suppose that cables to Broomhall do not cover the movement from some ports of this sort. It seems impossible, however, to say precisely how far net exports ought to exceed shipments on the average or in a particular year for these reasons alone.

ANNUAL DATA: TOTAL SHIPMENTS AND TOTAL OVERSEAS NET EXPORTS

In one respect Broomhall's total shipments would be expected to differ from net exports, other things equal, because they are described as "overseas" shipments (though, as we have seen, the term is not exact). In so far as shipments are in fact overseas shipments, they would fall below net exports on account of the overland movement from Hungary and Jugo-Slavia and on account of a small movement by rail from the United States to Mexico; a small movement by rail would also be possible from Russia and Poland. Again, shipments from North America in particular crop years might not accord, other things equal, with combined net exports from the United States and Canada. Canada exports wheat and flour through United States ports; the United States exports wheat through Canadian ports. Officially, exports are recorded as such when they leave the country, but shipments are recorded when

they leave seaboard or ports equivalent to seaboard, as Montreal on the St. Lawrence River. If, within a given crop year, stocks of Canadian wheat in United States positions are increased, and stocks of United States wheat in Canada are increased, then the combined net exports of the United States and Canada will for this reason alone exceed the shipments from North America. Other things equal, the reverse would be true when these stocks are decreased within a crop year.

Since such stocks are accounted for at the end of the crop year, at least in a large measure,¹ it is possible to adjust Canadian and United States official net export statistics so as to reach what may be called overseas net exports; and these north American overseas net exports may be employed in calculating total net exports for comparison with total shipments. Table 3

TABLE 3.—TOTAL OVERSEAS NET EXPORTS OF WHEAT AND FLOUR, AND BROOMHALL'S SHIPMENTS, BY CROP YEARS FROM 1921-22*

(Million bushels)			
August-July	Overseas net exports	Shipments	Excess of exports over shipments
1921-22.....	699.6	643.6	56.0
1922-23.....	713.2	675.9	37.5
1923-24.....	823.5	766.3	57.2
1924-25.....	768.8	706.0	62.8
1925-26.....	701.0	668.7	32.2
1926-27.....	846.9	815.8	31.1
1927-28.....	815.1	796.6	18.5
1928-29.....	932.3	918.2	14.1
1929-30.....	628.3	614.0	14.3
Average.....	769.9	733.9	36.0

* Data as described in footnote to Table 2, p. 271, except that the net exports there shown are here adjusted for changes within crop years of stocks of United States wheat in Canadian ports and of stocks of Canadian wheat in lake and Atlantic ports of the United States. When these stocks were reduced by (say) 10 million bushels between approximately August 1 and the following July 31 of a crop year, the net exports (as shown in Table 2) of that year were increased by 10 million bushels in order to determine the overseas net exports; and conversely when stocks were increased by 10 million bushels.

compares Broomhall's shipments with total net exports, so adjusted for changes in North American stocks as to represent overseas net exports as closely as possible. The effect of the adjustment is to make the av-

¹ See below, p. 279.

erage discrepancy smaller, as between overseas net exports and shipments, than it was between net exports and shipments by something over 2 million bushels per year. The changes in stocks of Canadian wheat in United States positions and of United States wheat in Canadian positions were such that overseas net exports fell below net exports in each of the nine years except 1925-26 and 1929-30, when the overseas net exports were the larger. Over the period as a whole, net exports exceeded overseas net exports by some 20 million bushels; the stocks were larger at the end than at the beginning of the period.

mains, some 35 million bushels per year. If one is to explain the excess year by year, it becomes necessary to examine the statistics of total overseas net exports and of shipments by reference to the several countries or group of countries from which both shipments and exports are made.

In such a comparison, Argentina and Australia are the only countries for which direct comparisons between net exports and shipments are feasible. Broomhall reports the shipments from the United States and Canada not separately, but combined as shipments from North America; to effect comparisons, it is therefore necessary to

TABLE 4.—DIFFERENCES BETWEEN BROOMHALL'S SHIPMENTS AND OVERSEAS NET EXPORTS, BY REGIONS AND BY CROP YEARS, 1921-22 TO 1929-30*

(Million bushels)

Item	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30
EXCESS OF EXPORTS OVER SHIPMENTS									
North America	35.0	25.2	25.2	26.5	17.9	6.6	16.7	13.7	16.8
Argentina .....	...	2.1	...	1.3	0.3	3.8	0.2	2.1	...
Australia	3.7	2.5	8.1	6.3	3.0	...	...	...	...
Other countries	18.2	7.5	24.7	28.7	11.2	21.7	5.9	1.1	2.3
Total	56.9	37.3	58.0	62.8	32.4	32.1	22.8	16.9	19.1
EXCESS OF SHIPMENTS OVER EXPORTS									
Argentina	1.0	...	0.8	...	...	...	...	...	2.5
Australia .....	...	...	...	...	...	1.1	4.3	2.9	2.2
Total	1.0	...	0.8	...	...	1.1	4.3	2.9	4.7
NET EXCESS, EXPORTS OVER SHIPMENTS									
Total	55.9	37.3	57.2	62.8	32.4	31.0	18.5	14.0	14.4

* Overseas net export statistics from sources described in the footnote to Table 2, p. 271, and compiled as described there and in the footnote to Table 3. Shipments data from sources described in the footnote to Table 2, except that shipments from "other countries" were obtained by subtracting from total shipments the shipments from North America, Argentina, and Australia, since the *Corn Trade Yearbooks* do not list separately the shipments from "other countries."

In so far as official net exports can be expected to accord with Broomhall's shipments, the concordance ought to be closest between overseas net exports as shown in Table 3 and shipments as there shown;¹ consequently, it is the difference in these two sets of data that receives emphasis in this inquiry. A sizable average excess of overseas net exports over shipments re-

add together the overseas net exports of the United States and of Canada. All other countries than these four must be treated as a single group, for over the nine-year period shipments from any one of them are not clearly and explicitly reported separately from shipments from one or more of the others.

Table 4 serves to indicate, with regard to groups of countries where shipments or exports originate, the countries whose shipments and net exports diverge most widely

¹ Except for the fact that shipments for the crop year 1924-25 were reported by Broomhall as larger than the shipments data shown in the table.

one from the other. It is readily apparent that, so far as concerns Argentina, shipments and net exports differ only slightly; and the difference is not striking with regard to Australia. North American shipments and overseas net exports diverge considerably, and explanation of this di-

vergence constitutes the principal problem in the present study. Shipments and net exports from other countries also differ considerably and require detailed comment. Explanations other than those of a general nature already mentioned are considered in subsequent sections.

II. NET EXPORTS AND SHIPMENTS FROM THE PRINCIPAL COUNTRIES

ARGENTINA

In contrast particularly with the United States and the Danube countries, the points on the frontiers or seaboards of Argentina and Australia from which wheat and flour are exported are relatively few in number. Consequently, the process of keeping quantitative account of the outward movement from these two countries ought to be relatively easy. One would expect fairly close concordance to appear between Broomhall's shipments and official net exports; and such is the situation. There are, however, a few noteworthy discrepancies.

Table 5 shows Argentine official net exports by August-July crop years, in contrast with Broomhall's shipments. On the average, net exports have exceeded shipments by only six-tenths of a million bushels per year, or less than half of one per cent. The largest difference, an excess of net exports over shipments of 3.8 million bushels, occurred in 1926-27. A difference as small as this can probably be attributed merely to statistical procedures in converting and combining the units in which exports and shipments are originally reported, and in calculating crop-year totals. On the whole, therefore, it would appear that the concordance is as close as could reasonably be expected; and it seems reasonable to assume provisionally that either net exports or shipments yield a sufficiently accurate picture of the outflow of wheat and flour from Argentina.

It is possible, however, that the concordance is partly fortuitous. Argentina exports a little wheat and flour across land frontiers to neighboring South American countries; it may be that these exports are included in the official statistics but not in Broomhall's shipments. On the other hand, Broomhall describes the shipments not as shipments from Argentina alone, but as

shipments from Uruguay as well; wheat and flour moving from Uruguay of course is not included in the official Argentine statistics. Net exports from Uruguay averaged somewhere between 2 and 2.5 million bushels per year over the period 1921-29 (calendar years).¹ If Broomhall includes

TABLE 5.—NET EXPORTS OF WHEAT AND FLOUR FROM ARGENTINA, AND BROOMHALL'S SHIPMENTS, BY CROP YEARS FROM 1921-22*

(Million bushels)			
August-July	Net exports	Shipments	Difference
1921-22.....	118.1	119.1	+1.0
1922-23.....	139.4	137.3	-2.1
1923-24.....	172.2	173.0	+0.8
1924-25.....	123.1	121.8	-1.3
1925-26.....	94.4	94.1	-0.3
1926-27.....	143.0	139.2	-3.8
1927-28.....	178.1	177.9	-0.2
1928-29.....	224.0	221.9	-2.1
1929-30.....	150.4	152.9	+2.5
Average.....	149.2	148.6	-0.6

* Net exports are official data, largely as reported by the International Institute of Agriculture. Shipments compiled from weekly data in Broomhall's *Corn Trade Yearbook*, 1930, and *Corn Trade News*, weekly issues in 1929-30.

all of these exports from Uruguay, it follows that his records of shipments from Argentina alone would be not .6 million bushels per year on the average smaller than Argentine net exports, but something like 3 million bushels smaller. Even so, the discrepancy would not be large enough to assume major significance.

AUSTRALIA

Table 6 shows official net exports from Australia in contrast with Broomhall's shipments, by crop years.

¹ It is impossible precisely to calculate this average, for statistics of wheat exports from Uruguay are lacking for the calendar year 1923.

Of the several countries or groups of countries for which comparisons of shipments and net exports are feasible, Australia ought to be the country to show the closest concordance between the two, if accurate account has been kept of shipments on the one hand and net exports on the other. Australia has no land frontiers; all exports or shipments must go from seaports. Australian imports have been entirely insignificant. In so far as discrepancies of appreciable size (larger than would be accounted for by conversion and statistical manipulation) occur between shipments and net exports, one must conclude either that shipments or net exports, or both, misrepresent the facts as to the outflow of Australian wheat and flour.

On the average, net exports have exceeded shipments by about 1.4 million bushels per year, or some 1.6 per cent. The discrepancy is of trifling significance if one is considering the difference between world

account of this reversal, the average discrepancy, which shows net exports to have exceeded shipments by 1.4 million bushels, is not representative.

One may reasonably disregard the smaller discrepancies as reflecting merely statistical procedures in conversion and compilation. But when net exports exceed shipments by as much as 5.2, or 10.5, or 5.4 per cent, as was true in 1922-23, 1923-24, and 1924-25, and when on the other hand shipments exceed net exports by as much as 6.1 per cent, as in 1927-28, it seems impossible to escape the conclusion that improper account of the quantity of wheat and flour leaving Australian ports for foreign destinations is taken in one or the other of the series. The question as to which set of statistics better reflects the facts assumes some significance. It is quite impossible to formulate anything other than a tentative and not too well founded conclusion. In general, however, one must conclude that the official statistics are presumably the more accurate, simply because they ought to be more inclusive, and are prepared for publication in a more leisurely manner, with relatively greater attention to clerical details.

If it is to be assumed that the official net export statistics are the more accurate throughout the period, the reversal of the relationship with shipments between the first five and the last four years of the period carries certain implications. It would seem possible that sometime about the middle of the nine-year period the method of collecting or compiling shipments data may have been altered. One can only guess what sort of change occurred, if any did occur. It would be reasonable, in the light of what certainly occurred with regard to shipments from the Danube countries, to infer that shipments data have been secured from more ports of clearance in the latter than in the former part of the nine-year period; but this is no more than a guess. We find no plausible explanation of the fact that shipments have exceeded net exports in each of the four years beginning with 1926-27. If during this period clearances of vessels have been accounted for from all ports in both the net export and the shipments statistics, the only possible

TABLE 6.—NET EXPORTS OF WHEAT AND FLOUR FROM AUSTRALIA, AND BROOMHALL'S SHIPMENTS, BY CROP YEARS FROM 1921-22*

(Million bushels)

August-July	Net exports	Shipments	Difference
1921-22.....	114.6	110.9	-3.7
1922-23.....	50.3	47.8	-2.5
1923-24.....	85.6	77.5	-8.1
1924-25.....	123.6	117.3	-6.3
1925-26.....	77.2	74.2	-3.0
1926-27.....	102.7	103.8	+1.1
1927-28.....	70.7	75.0	+4.3
1928-29.....	108.6	111.5	+2.9
1929-30.....	62.6	64.8	+2.2
Average.....	88.4	87.0	-1.4

* Net exports are official data, largely as reported by the International Institute of Agriculture. Shipments compiled from weekly data in Broomhall's *Corn Trade Yearbook*, 1930, and *Corn Trade News*, weekly issues in March-July 1930.

total net exports and total shipments, but is fairly large so far as concerns Australian exports taken alone. It is particularly striking that in the first five years of the period net exports exceeded shipments by amounts ranging from 2.5 to 8.1 million bushels per year; while in the last four years of the period the situation was reversed, and shipments exceeded net exports by amounts ranging from 1.1 to 4.3 million bushels. On

explanations of the continued excess of shipments seem to be (1) that some coast-wise shipments (possibly from the Australian mainland to Tasmania) may have been counted as overseas shipments, and not as net exports; (2) that there has been some other sort of double counting in shipments; or (3) that the different methods of converting original data to bushels and of calculating totals may give rise to greater discrepancies than one would suppose.

NET EXPORTS, SHIPMENTS, AND CLEARANCES FROM NORTH AMERICA

As we have seen, net exports or overseas net exports from North America have exceeded shipments in each of the nine years under review, and this excess accounts in large part for the general excess of total overseas net exports over total shipments. In the present section it is desirable to review in considerable detail the several sets of statistics that bear on the outward flow of wheat and flour from North America (here defined as the United States and Canada only).

The outflow of wheat and flour from North America may be measured in several ways. In earlier sections use has been made of (1) Broomhall's shipments, (2) the sum of net exports from the United States and Canada, and (3) the sum of overseas net exports from the United States and Canada, overseas net exports being net exports adjusted for changes in stocks of United States wheat in Canadian ports and of Canadian wheat in United States ports. In addition, *Bradstreet's* publishes weekly data on clearances of wheat and flour from the United States and Canada; these data may be compiled in monthly or annual form, by the same method used in transforming Broomhall's weekly data on shipments.¹ A fifth series (covering, however, only five of the nine years) may be compiled from official statistics, to include (1) domestic exports from the United States, plus shipments to possessions, both as officially reported, the sum being adjusted for changes in the stocks of United States wheat in Canadian positions; (2) clear-

ances of Canadian wheat and flour from Atlantic ports of the United States, as reported by the United States Department of Commerce; (3) direct exports of Canadian wheat and flour overseas from Canadian ports on the Atlantic and Pacific and on the St. Lawrence; and (4) clearances from Montreal of Canadian wheat originally reported as exported via the United States (mostly Buffalo), but re-routed from Buffalo for export via Montreal. For convenience, this series may be termed "official clearances" from North America.

With regard to North America, the question as to which series best represents the facts is of considerable importance, not only because one's notions of the magnitude of the yearly or monthly total volume of international trade in wheat and flour, and of the course of trade from month to month, depend somewhat upon the series that is employed, but also because the subject has received some discussion. Thus Broomhall, noting for the crop year 1924-25 that official net exports from the United States and Canada exceeded his report of shipments by around 28 million bushels, explained the discrepancy as follows:

... Most of the discrepancy must be attributed to two principal causes namely, transfrontier exports and duplications. A part of the difference may be due to omissions on the part of our agents in North America, in their rush to provide early intimation of weekly shipments from a great number of ports, they may occasionally miss some cargoes, but we do not think these omissions amount to very much, the principal part of the discrepancy is probably due to duplications, frontier exchanges, and bookkeeping differences in the United States and Canadian Custom Houses.²

One may infer from this statement that Broomhall regards his data on shipments as closely representing the facts regarding the North American outflow of wheat and flour; on the other hand, one may always suppose that Canadian and United States official trade statistics are designed to provide an accurate picture. It is therefore justifiable to attempt rather close comparisons—an attempt which presumably would be out of place in analyzing statistics of net exports and of shipments from the Danube countries, since there is no evidence that the shipments statistics have consistently

¹ See above, p. 269.

² *Corn Trade News*, August 4, 1925.

been designed to secure a complete record of the outflow of wheat and flour from that region.

Table 7 shows North American (United States and Canadian) net exports, overseas net exports, official clearances, Broomhall's shipments, and *Bradstreet's* clearances by crop years from 1921-22, so far as the data are available. In general, the net exports, overseas net exports, and official clearances are of much the same size; Broomhall's shipments are smaller; *Bradstreet's* clearances are smaller still. Using net export statistics, therefore, one might say that the outflow of wheat from North America averaged 465 million bushels, ranging from 331 to 559 million; using *Bradstreet's* clearances, one might say that the outflow averaged only 415 million, and ranged from 304 to 501 million. The difference in the averages, 50 million bushels, is quantitatively larger than the average annual post-war net imports of France, which ranks as the world's fourth largest net importing country.

This comparison, however, overstates the range of probabilities as to the outflow of wheat from North America. The net exports clearly do not give the quantity of wheat that actually leaves the noncontiguous boundaries of the United States and Canada each year—the quantity, in short, that is sought to be measured within a small margin of error by Broomhall's statistics of shipments (except what passes the land frontier between Mexico and the United States). Some wheat reported within a crop year or over a period of years as exported net from Canada may not leave the coast of North America, but may go to increase stocks of Canadian wheat in the United States; similarly, some wheat reported as exported net from the United States may go to increase stocks of United States wheat in Canada. Since these stocks increased over the nine-year period, net export statistics must exceed the actual outflow from North America for this reason alone. But the effect on average annual exports is small; it is important rather with

respect to fluctuations in exports from year to year.

On the other hand, *Bradstreet's* statistics of clearances appear not to be designed to account completely for the outflow of wheat and flour from the noncontiguous coastal boundaries of the United States and Canada. It is stated that the clearances are from the "principal" ports, not from all ports. Hence, one is justified in assuming that *Bradstreet's* clearances understate the

TABLE 7.—NET EXPORTS, OVERSEAS NET EXPORTS, OFFICIAL CLEARANCES, BROOMHALL'S SHIPMENTS, AND *Bradstreet's* CLEARANCES OF WHEAT AND FLOUR FROM NORTH AMERICA (THE UNITED STATES AND CANADA), BY CROP YEARS FROM 1921-22*

(Million bushels)

August-July	Net exports	Overseas net exports	Official clearances	Broomhall's shipments	<i>Bradstreet's</i> clearances
1921-22...	439.9	438.5	.....	403.5	376.2
1922-23...	482.1	481.3	.....	456.1	426.8
1923-24...	476.3	475.4	.....	450.2	399.7
1924-25...	451.3	449.7	449.5	423.2	431.4
1925-26...	430.2	431.8	429.5	413.9	396.9
1926-27...	494.1	492.0	492.9	485.4	434.9
1927-28...	519.2	509.4	505.0	492.7	467.3
1928-29...	559.3	550.0	536.4	536.3	500.9
1929-30...	330.7	335.9	.....	319.1	303.9
Total...	4,183.1	4,164.0	.....	3,980.0	3,738.0
Average	464.8	462.7	.....	442.2	415.3

* Data from *Monthly Summary of Foreign Commerce* (United States); *Report on the Grain Trade of Canada*; *Corn Trade News* and *Corn Trade Yearbook*; and *Bradstreet's*.

actual outflow, and ought not to be employed as a test of the accuracy of Broomhall's shipments statistics, at least so far as concerns annual totals.¹ The actual outflow of North American wheat is presumably to be measured either by official statistics of overseas net exports, or by official statistics of clearances, or by Broomhall's shipments—assuming, of course, that one or another of the three series is accurate.

We may first compare overseas net exports with Broomhall's shipments. The exports exceed the shipments by 20.4 million bushels per year on the average. Year by year, the excess of exports over shipments has been as follows, in million bushels:

¹ *Bradstreet's* clearances, however, are of some value in adjudging whether or not Broomhall's data represent accurately the outflow of wheat from North America month by month. See below, p. 291.

1921-22	35.0	1926-27	6.6
1922-23	25.2	1927-28	16.7
1923-24	25.2	1928-29	13.7
1924-25	26.5	1929-30	16.8
1925-26	17.9	Average	20.4

In absolute terms, the discrepancy of 20.4 million bushels accounts for over half of the average annual discrepancy between total world overseas net exports and total world shipments. In percentage terms, there is less of a discrepancy between overseas net exports and shipments from North America than appears between net exports and shipments from the Danube countries, India, and Russia, though more of a discrepancy than appears on the average between net exports and shipments from Argentina and Australia.

The question may well be asked whether there is any reason why overseas net exports from North America ought to coincide with Broomhall's shipments from North America. In some respects, it is clear, coincidence is not to be expected. A small amount of wheat and flour moves overland by rail from the United States to Mexico; and what we have termed overseas net exports ought to exceed Broomhall's shipments at least by the amount so exported, for Broomhall apparently seeks to account only for the outflow of wheat from seaboard. The amount of wheat and flour moving overland to Mexico, however, was only 1.4 million bushels per year on the average over the period 1921-28 (calendar years);¹ consequently, this overland movement does not go far to explain the discrepancy of 20.4 million bushels. Again, it might seem possible that a few million bushels of the discrepancy could be explained by differences in the processes employed in converting quantities of flour to represent quantities of wheat. But in both sets of statistics a bushel of wheat is defined as 60 pounds; and, although Broomhall converts flour to wheat on the basis of 4.667 bushels of wheat per barrel of flour of 196 pounds, whereas the official statistics are converted at 4.5 bushels per barrel for Canada and 4.7 bushels per barrel for the

¹ This figure represents average annual exports from the three customs districts of San Antonio, El Paso, and Arizona; data from *Foreign Commerce and Navigation of the United States*.

United States, correction of this difference in practice would enlarge the discrepancy by approximately 1.5 million bushels a year on the average, and not reduce it. It seems probable, then, that the discrepancy must be explained in other ways than by reference to statistical procedures of compilation (not collection) of data, or to the overland movement to Mexico.

Now the process of accounting for the wheat and flour moving from the coastal noncontiguous boundaries of Canada and the United States is essentially a simple procedure; given a representative in every port, the counting of quantities ought to be feasible. This is Broomhall's general procedure, the questions being whether or not reports are received from all points, and whether or not all reports are complete. The process of employing export and import statistics to account for the outflow from noncontiguous coastal boundaries is more complicated, and requires explanation. It is complicated because the United States sends wheat and flour to Canada, some of which is retained there, most of which is shipped overseas (mostly Duluth or Chicago to Georgian Bay and lower lake ports to Montreal); Canada likewise ships wheat and flour to and through the United States (mostly Fort William-Port Arthur to Buffalo to New York-Philadelphia-Baltimore). Moreover, Canada ships wheat to the United States (principally to Buffalo from Fort William-Port Arthur), and this wheat is shipped back to Canada and exported overseas (principally from Montreal). With this crisscross movement, it would at least seem possible at first glance that more or less wheat should be counted twice. It might seem to be counted once in the exports of Canada and once in the exports of the United States, or vice versa; or once as an export from Fort William-Port Arthur and again as an export from Montreal.

But the likelihood of double counting seems to be more apparent than real; there may be opportunity for a little inaccuracy in the official statistics, but hardly for overstatement that would amount to between 15 and 20 million bushels a year on the average. Several avenues whereby it might seem possible to discover double counting

may be dismissed briefly. In the first place, it seems unreasonable to suppose that there can be significant errors in the import statistics of either country. If smuggling in both directions occurs on the land frontier, as is rumored, it could hardly be significant for a commodity as bulky as wheat. In the second place, there seems to be little reason to suppose that the corrections applied to net export statistics to reach overseas net exports can be significantly in error on the ground that the stocks statistics are inadequate. For the most part, the year-end stocks of Canadian wheat in United States positions and the United States wheat in Canadian positions must be held in elevators where they are readily measured, the more so because these stocks are under bond in each country. The stocks statistics may not include some wheat that is moving by rail or canal or on the Great Lakes, and if so are not complete; but at the end of July this movement cannot be of large magnitude, though it may be in the fall months. In the third place, the official export statistics are not likely to involve double counting by reason of coastwise domestic shipments being reported as an export at the point of shipment. The volume of shipments of wheat by sea from one port of the United States to another is fairly large on the Pacific Coast; but the customs officials distinguish between shipments passing to foreign destinations and shipments passing to domestic destinations, and publish records of both.¹ It seems fairly clear that, in so far as there may be double counting in the official export statistics, it must lie in the crisscross movement of wheat on the Great Lakes.

Bearing in mind that an export of wheat

¹ It should be observed that double counting in this respect would be quite as likely to occur with regard to Broomhall's shipments as to official export statistics.

² In 1928-29, the distribution of lake shipments of wheat by destination was as follows: to Canadian ports, 136.3 million bushels; to United States ports, 156.6 million; to Europe direct, .6 million.

³ In 1928-29, out of 136.3 million bushels of wheat shipped from Fort William-Port Arthur to other Canadian ports, some 73.7 million bushels went to Georgian Bay and Lake Huron ports (Depot Harbour, Goderich, Midland, Owen Sound, Port McNicoll, Sarnia, and Tiffin), 61.8 million bushels to Montreal and Port Colborne, and only .8 million bushels to Toronto and Quebec.

from either country is recorded when wheat leaves port for a foreign destination, let us examine more closely the movement on the Great Lakes. So far as concerns Canada, lake shipments mostly originate at Fort William-Port Arthur. Of the cargoes that originate there, some go to Canadian ports, some to United States ports, some to European destinations, though these are very small in number.² About half of the shipments to Canadian ports go to destinations on the shores of Georgian Bay and Lake Huron; the remainder goes mostly to Port Colborne on the eastern end of Lake Erie and to Montreal.³ None of this wheat is counted as an export when it leaves Fort William-Port Arthur. There can be no double counting with respect to this part of the movement on the Great Lakes, which will be reported as an export only when it leaves some point farther east in Canada.

Of the lake shipments originating in Fort William-Port Arthur, the quantity that passes to United States ports is recorded as an export when it leaves the head of the lakes. This wheat moves mostly to Buffalo; in smaller quantities to Erie, Fairport, and Toledo; occasionally, in relatively very small amounts, to Chicago, Cleveland, and Duluth-Superior. It disappears in three ways: some is absorbed in the United States; some passes through the United States to foreign destinations other than Canada; some passes back to Canada, again to move to a foreign destination. The amount absorbed in the United States cannot be counted twice in Canada, since it never returns there. It is recorded in the United States as an import, and doubtless accurately recorded; some of it that is milled in bond is counted as flour export from the United States, but this does not result in double counting of North American net exports, for the United States net exports consist of exports of domestic produce (including Canadian flour milled from bonded wheat) minus imports of wheat. Nor can the amount that passes through the United States to destinations other than Canada be counted twice. It never returns to Canada, and hence cannot be counted once as a Canadian export from Fort William-Port Arthur and again as a Canadian export from a point in eastern

Canada. Nor does it seem possible that any of this wheat can be counted as a net export from the United States. On arrival in the United States from Canada it is bonded. The carriers are pledged to maintain its identity; governmental machinery exists to see that the pledges are kept, to supervise the storage of it in elevators or bins assigned for the purpose, to supervise removal, and to seal cars and barges that transport it from lake to Atlantic ports. In view of the care used to preserve identity, it is difficult to believe that at (say) New York the customs officials are likely to record wheat of Canadian origin, loaded from a bonded elevator, as wheat of United States origin. The shipments of Canadian "in transit" wheat and flour from United States Atlantic ports are in fact recorded separately by the United States officials, and do not figure in any way as exports from the United States.

The third category of lake shipments from Fort William-Port Arthur comprises wheat sent from these ports to Buffalo, and from Buffalo transshipped and sent back to Canada, usually Port Colborne-Montreal. Now all Canadian wheat except that which pays the duty at once is placed in bond as soon as it reaches Buffalo, where all of it is unloaded and weighed. When there arrives in Port Colborne or Montreal a parcel of wheat of Canadian origin that was shipped from Buffalo, this wheat must be treated by Canadian customs officials either (rarely) as an import, or as a shipment from the United States to be handled in a system of bonded carriers and warehouses similar to that in the United States. Once in bond, it receives special supervision, as occurs in the United States. It may be withdrawn from bond and retained in eastern Canada, or withdrawn from bond and milled into flour in eastern Canada and later shipped out of the country as flour, or simply sent out of eastern Canada to a foreign destination. But the Canadian customs officials do not record a shipment of bonded wheat from Montreal to (say) London as an export of Canadian produce; and identification of bonded wheat is certain because of the documents that must accompany it.

When one understands the methods of

reporting the wheat movement, it becomes apparent that Canadian wheat and flour cannot be counted twice in the export statistics as moving out of North America. The bonding process insures proper recording in spite of the crisscross movement, and insures it with respect to shipments via Fort William-Port Arthur, Buffalo, and Montreal. This is not to say that clerical errors never occur in the customs services; but aside from such errors, one can see no good reason for supposing that there is persistent double counting with regard to the wheat and flour that originate in Canada and pass from the coasts of Canada and the United States.

In the same way one may reasonably argue that double counting does not occur with respect to wheat grown in the United States, moved from United States ports on the Great Lakes (mostly Duluth-Superior and Chicago) either to other United States ports (mostly Buffalo) or to Canadian ports (mostly the Georgian Bay and Lake Huron ports, and Port Colborne), and later to overseas destinations. Only such of this wheat as clears for a Canadian port is recorded as an export from the United States; the portion moving to Buffalo does not become a United States export unless and until it passes abroad from Buffalo via New York. The portion that goes through Canada is bonded, and is not reported by Canadian officials as an export of Canadian wheat.

Moderately good evidence that the official net export statistics as ordinarily computed (but with adjustment for changes in stocks) reflect accurately the movement overseas of Canadian and United States wheat and flour is afforded by the fact that a different compilation of official export or clearance statistics closely approximates the net export statistics. This series, shown so far as it is available in the third column of Table 7 (p. 277), involves summation of six separate series. Of these, the first is gross exports of domestic produce from the United States; the second is shipments to possessions. Combined, these two series show how much wheat and flour passed out of the United States in any year. With adjustment for the amount by which stocks of United States wheat in Canadian ports in-

crease or decrease each year, the combined series shows how much wheat and flour grown or manufactured in the United States left the coast of North America for overseas destinations, except that it includes also the small amount that passes overland across the Mexican frontier. The third series comprises exports from the Pacific ports of Canada; since wheat does not move from these ports to the United States, this series represents overseas exports of Canadian produce. The fourth series comprises exports from the Atlantic and St. Lawrence ports of Canada directly to overseas destinations. The fifth consists of shipments overseas of Canadian produce from Atlantic ports of the United States. The sixth shows the quantities of Canadian wheat moved, after arrival at Buffalo from Fort William and Port Arthur, back to Canadian ports.

Now the series we have called "official clearances" from North America seemingly ought to show within a narrow margin of error how much wheat and flour leaves the noncontiguous boundaries of Canada and the United States. It is compiled with little reference to the confusing crisscross movement on the Great Lakes; the data are for the most part obtained from ports where ocean-going vessels clear for overseas destinations. In general, the series ought to represent the overseas movement over a period of years more closely than the movement within a crop year, and the movement within a crop year more closely than the movement within a month. When we find that this series of overseas official clearances coincides with official overseas net exports so closely that the difference is only 2 million bushels a year on the average over a five-year period, it seems reasonable to conclude that the official statistics adequately measure the overseas movement. If so, Broomhall's shipments must present an incomplete picture, since these fall 20.4 million bushels below official overseas net exports. In short, explanation of the discrepancy between official export statistics and Broomhall's shipments from North America seems to us to lie, not in duplication on the part of the official agencies, but in some aspects of Broomhall's service—possibly, as he suggests, in his agents' "rush

to provide early intimation of weekly shipments from a great number of ports," or in absence of reports from some of the ports from each of which very little wheat or flour is shipped. The discrepancy, considering the large number of ports from which wheat and flour are exported from North America, seems astonishingly small.

If the official overseas net export statistics are taken as accurate in each of the nine years, it seems reasonable to suppose that the scope of Broomhall's service was somewhat enlarged over the nine-year period. Overseas net exports exceeded shipments in the four years 1921-22 to 1924-25 by from 5.6 to 8.7 per cent; but in the five years 1925-26 to 1929-30, the excess ranged from 1.4 to 5.2 per cent.

OTHER EXPORTING COUNTRIES

As we have seen, the discrepancy between net exports and shipments tends, in absolute terms, to be small as regards Argentina and Australia, and relatively large as regards North America. North American overseas net exports exceeded Broomhall's shipments by about 20 million bushels a year on the average, but Argentine and Australian net exports exceeded shipments by only .6 and 1.6 million bushels a year on the average. When we compare net exports and shipments from other countries than these four, net exports exceed shipments by 13.5 million bushels per year on the average; consequently, the recording of the outflow of wheat from these other countries merits fairly detailed examination if one is to explain the discrepancy between total overseas net exports and total shipments, which amounted to around 36 million bushels a year on the average.

Table 8 (p. 282) shows, by crop years, net exports from other countries than Canada, the United States, Argentina, and Australia in contrast with Broomhall's shipments. The average discrepancy was 13.5 million bushels; in 1928-29 it was only 1.1 million; in 1924-25 it was as large as 28.7 million.

The term "other countries" had different meanings as applied to net exports and to shipments. Net exports from "other countries" represent each year the sum of net exports from India, Russia, Hungary, Bul-

garia, Roumania, Jugo-Slavia, Spain, Poland, Chile, Algeria, Morocco, and Tunis, if these countries were net exporters in the year in question. It is impossible to ascertain from published descriptions precisely what countries comprise Broomhall's list.

TABLE 8.—NET EXPORTS OF WHEAT AND FLOUR FROM COUNTRIES OTHER THAN NORTH AMERICA, ARGENTINA, AND AUSTRALIA, AND BROOMHALL'S SHIPMENTS, BY CROP YEARS FROM 1921-22*

(Million bushels)

August-July	Net exports	Shipments	Excess of exports over shipments
1921-22.....	28.4	10.2	18.2
1922-23.....	42.2	34.7	7.5
1923-24.....	90.3	65.6	24.7
1924-25.....	72.4	43.7	28.7
1925-26.....	97.6	86.4	11.2
1926-27.....	109.2	87.5	21.7
1927-28.....	56.9	51.0	5.9
1928-29.....	49.7	48.6	1.1
1929-30.....	79.4	77.1	2.3
Average.....	69.6	56.1	13.5

* Net exports chiefly from *Crop Reports* and *Yearbooks* of the International Institute of Agriculture; the countries are Hungary, Jugo-Slavia, Roumania, Bulgaria, India, Russia, Algeria, Morocco, Tunis, Chile, Poland, and Spain. Crop-year net exports from Chile and Morocco are estimated on the basis of calendar-year statistics. Russian net exports are July-June figures. Shipments represent the difference between total shipments on the one hand and shipments from North America, Argentina, and Australia on the other.

The three categories most commonly to be found are (1) India; (2) Russia, Danube, and Black Sea; and (3) "other countries." One finds specific mention as countries of India (in all years); Manchuria (1921-22 only); Persia (1922-23 and 1924-25); Mesopotamia (1923-24 and 1924-25); Hungary (1923-24, 1924-25, 1925-26, 1926-27); Russia (1923-24, 1925-26, 1926-27, 1927-28, 1928-29, 1929-30); Chile (1924-25, 1925-26, 1926-27, 1927-28, 1928-29, 1929-30); Germany (1925-26); Poland (1926-27); and France (1929-30). The terms "Danube" and "Balkans" occur with reference to the statistics in all years except 1921-22; but no statement is made as to what countries are the Danube or Balkan countries. The term "North Africa" is mentioned with reference to shipments in 1924-25 and thereafter, but no statement is made as to whether or not shipments from all three of the French dependencies, Algeria, Morocco, and Tunis,

are included in all years. The term "other countries" almost always appears, but is not precisely defined.

Under these circumstances it is apparent that close comparisons between shipments and net exports, country by country, are not feasible. When Broomhall includes shipments from Manchuria, Persia, Mesopotamia, Germany, and France, other things equal, one would expect shipments from "other countries" as a group to exceed net exports, because the net export statistics do not include wheat or flour moving from these countries. But one cannot state the converse of this, because the detailed list of countries from which Broomhall records shipments is not specified for any year.

Nevertheless, some inferences may be made from the available data. A part of the average annual discrepancy of 13.5 million bushels between net exports and shipments lies in the recording of the outflow of wheat from India; net exports averaged 12.8 million bushels, shipments 11.3 million, net exports exceeding shipments by 1.5 million bushels on the average, though in one year (1924-25) net exports were 6.4 million bushels the larger, and in another (1929-30) shipments were 3.5 million the larger.¹ Another part of the total discrepancy lies in the recording of the outflow of wheat from Russia; net exports averaged about 12.5 million bushels per year, shipments some 1.1 million bushels less, or 11.4 million. But it would be improper to infer that in general the shipments from Russia tend to fall below the net exports, for the comparison is not sufficiently exact.² Thus, one may say that net exports from the "other countries" group exceed ship-

¹ These comparisons are based upon summations of weekly shipments data, without regard for the number of weeks included within a crop year. Only in 1929-30 did shipments exceed net exports from India; this arises from the fact that India shipped out wheat but imported more than she shipped in some months, and the net export statistics take account of the imports, while the shipments statistics do not.

² The Russian net export statistics are for July-June crop years, the shipments data for August-July crop years of either 52 or 53 weeks. In addition, no official net export statistics are available for the July-June or August-July crop year 1929-30. Nevertheless, it would be reasonable to suppose that Broomhall may not take account of a little Russian wheat exported via the Baltic and White Seas, and overland.

ments in small part because the recording of the outflow of wheat from India and Russia differs under the two methods. But the larger part of the excess of net exports over shipments remains to be explained by reference to the recording of the movement from Hungary, Jugo-Slavia, Bulgaria, Roumania, Spain, Poland, Chile, Algeria, Morocco, and Tunis.

A comparison of shipments in relation to net exports from the four Danube countries is necessarily inexact, for Broomhall has not published data for all years that may be taken to represent the outflow from these countries and from these alone. But one may obtain from the published data an indication of maximum shipments from the four Danube countries by crop years, and by years that comprise either 52 or 53 weeks. Such data appear in Table 9, in contrast with net exports.

On the average, net exports from the four Danube countries have exceeded shipments by nearly 8 million bushels a year—rather more than this because the shipments data represent the maximum quantities that can be described as originating in this area. Moreover, the statistics of Table 9 include 11.3 million bushels reported by Broomhall as "frontier shipments" in 1924-25; this quantity, which was not reported in Broomhall's weekly statistics, is not included in our calculations of the shipments from all other countries than the four principal exporters as shown in Table 8; consequently, the average discrepancy between net exports and shipments there shown (13.5 million bushels) is explained to the extent of something like 10 million bushels by the recording of the outflow of wheat and flour from the Danube countries. It is clear, therefore, that Broomhall's shipments differ from official net export statistics more significantly with regard to the Danube countries than with regard to any other countries or groups of countries except North America. The discrepancy measured in million bushels is larger as regards North America, but in percentage terms is larger as regards the Danube countries.

One may infer that shipments from the Danube countries constitute a strikingly small percentage of net exports principally

because the original recording of the outflow is a more complicated task than is true of other areas. Argentina, Australia, Canada, the United States, Russia, India, and the northern African countries ship abroad very little wheat other than by sea.

TABLE 9.—COMBINED NET EXPORTS FROM HUNGARY, JUGO-SLAVIA, BULGARIA, AND ROUMANIA, AND BROOMHALL'S SHIPMENTS FROM THE DANUBE OR BALKAN COUNTRIES, BY CROP YEARS FROM 1921-22*

(Million bushels)

August-July	Net exports	Maximum shipments	Differences
1921-22.....	21.3	14.0 ^a	+ 7.3
1922-23.....	12.1	9.1 ^b	+ 3.0
1923-24.....	34.1	27.9 ^d	+ 6.2
1924-25.....	26.3	13.5	+12.8
1925-26.....	44.9	28.8	+16.1
1926-27.....	45.0	31.2	+13.8
1927-28.....	31.9	29.2	+ 2.7
1928-29.....	36.7	36.0 ^c	+ .7
1929-30.....	55.5	46.6	+ 8.9
Average.....	34.2	26.3	+ 7.9

* Net exports compiled from official data, largely as reported by the International Institute of Agriculture. Shipments compiled from annual totals given in the *Corn Trade News*.

^a Includes shipments from other areas, which certainly include Manchuria (288 thousand bushels) and possibly Chile, Algeria, Morocco, and Tunis.

^b Includes shipments from other areas, possibly Persia, Chile, Algeria, Morocco, and Tunis.

^c Fifty-three weeks.

^d Includes shipments from other areas, possibly Mesopotamia, Chile, Algeria, Morocco, Tunis.

^e Rough estimate. In 1928-29 Broomhall grouped shipments from the Danube countries with shipments from minor countries.

Of the Danube countries, Hungary and Jugo-Slavia in particular send large fractions of their exports to adjacent countries either up the Danube, otherwise by river, by canal, and by rail. It would not be difficult with a small number of agents to account, week by week, for the wheat moving from the lower reaches of the Danube and from ports on the Black Sea by ocean-going ships; but it would require a larger staff to account in full for the outflow of wheat and flour in small lots by barge and by carlots from the much more numerous points of egress on the Hungarian and Jugo-Slavian frontiers.

Some evidence appears to suggest that the scope of Broomhall's reports has been enlarged in recent years with respect to the Danube countries. In terms of million

bushels, the annual discrepancies between net exports and shipments have not tended markedly to become progressively smaller from year to year. But whereas shipments were 67.5 per cent of net exports over the five-year period 1921-22 to 1925-26 (in fact, rather less than 67.5 per cent because the data treated as Danubian shipments actually include shipments from other areas in 1921-22 to 1923-24), they were 81.7 per cent of net exports over the period 1926-27 to 1929-30. With rough allowance for overstatement of shipments in 1921-22 to 1923-24, the data of Table 9 suggest that the ratio of shipments to net exports has tended to increase progressively over the nine-year period, though there are irregularities that would be inevitable merely because the outflow from the lower Danube and the Black Sea, which is presumably well accounted for each year in the shipments statistics, varies in its relation to the outflow across inland frontiers.

So far as concerns net exports, the remaining list of countries includes Algeria, Morocco, Tunis, Spain, Poland, and Chile. It is not possible to compare the net exports of this group with shipments from a similarly constituted group. Net exports from these countries averaged about 10 million bushels a year. Shipments so far as reported, and including shipments from Germany of 14.4 million bushels in 1925-26

and from France of an unstated quantity in 1929-30, averaged 9.4 million bushels. It is clear that the discrepancy with regard to the miscellaneous subgroup of small exporters does not go far to explain the discrepancy (13.6 million bushels per year) with regard to the larger group that includes Russia, India, and the Danube countries. One may reasonably infer that shipments from the miscellaneous subgroup, unlike net exports, do not take account of the trifling outflow from Spain, for Spanish shipments seem nowhere to be mentioned as included in Broomhall's reports. Since the fairly close correspondence between net exports and shipments from the subgroup depends partly upon the inclusion in shipments of wheat and flour moving from Germany and France in 1925-26 and 1929-30, respectively, whereas these are not included in net exports, one may infer that net exports from Algeria, Morocco, Tunis, Chile, and Poland (one or the other, or all) would exceed shipments from these same countries. The excess might not be significant in absolute terms since the total quantities are so small, but it might be strikingly large in percentage terms. So far as one can determine the facts, the inclusion of shipments from Manchuria, Persia, and Mesopotamia in various years could affect the relationship of shipments to net exports only to a negligible extent.

III. AVERAGE MONTHLY SHIPMENTS AND NET EXPORTS

In view of the difference which exists between the official annual export figures for each principal exporting country and Broomhall's shipments figures for the same country, it is of interest to observe how the two sets of figures compare in their distribution among the several months of the year. Is there, in short, a tendency for discrepancies to be large in particular months and small in others, or are the annual average discrepancies distributed rather evenly among the several months of the year?

ARGENTINA

In monthly distributions, as in annual totals, the closest correspondence between shipments and exports is found in Argen-

tina. Table 10 shows nine-year averages of official Argentine exports and of Broomhall's Argentine shipments for each month of the year, together with the differences between these two sets of averages. The greatest difference, an excess of average net exports over average shipments of 1.1 million bushels, appears in the month of January. In August and November the differences are as small as one-tenth of a million bushels. It will be seen from the table that there are six months in which average exports exceed average shipments, and six months in which the reverse is true. However, neither average exports nor average shipments remain the larger for more than two consecutive months. Chart 1 shows that, on the average, exports and shipments

follow approximately the same course of increase and decrease throughout the year. It must be remembered, however, that some Uruguayan wheat is included in Argentine shipments, while exports possibly include some wheat and flour shipped over land borders. The correspondence is closer than one might expect, in the light of these facts;

TABLE 10.—AVERAGE MONTHLY NET EXPORTS AND BROOMHALL'S SHIPMENTS FROM ARGENTINA, 1921-22 TO 1929-30*

(Million bushels)

Month	Net exports	Shipments	Difference
Aug.	8.3	8.4	+0.1
Sept.	7.5	6.8	-0.7
Oct.	6.7	6.9	+0.2
Nov.	5.5	5.4	-0.1
Dec.	6.9	6.7	-0.2
Jan.	14.9	13.8	-1.1
Feb.	21.1	20.8	-0.3
Mar.	21.6	22.2	+0.6
Apr.	18.6	19.1	+0.5
May	14.5	14.3	-0.2
June	14.2	14.4	+0.2
July	9.6	9.9	+0.3

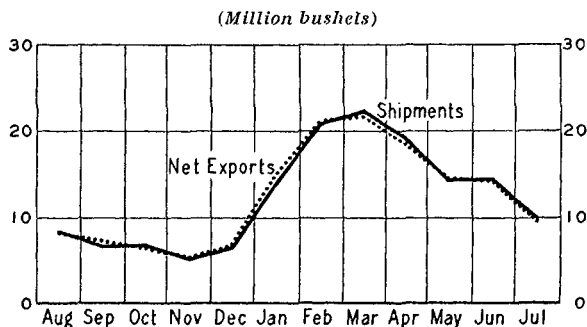
* Net exports are derived from official data, largely as reported by the International Institute of Agriculture. The monthly data do not include a few minor revisions that are taken into account in annual data as shown in Table 5, p. 274. Monthly shipments derived from weekly data as published in the *Corn Trade Yearbook* and the *Corn Trade News*; see text, p. 269.

but on the other hand, it becomes exceedingly hazardous to draw any positive inference from this correspondence.

In a general way the monthly averages indicate the relationship which may prevail, throughout a given year, between shipments and exports. The averages for some months, however, are much more typical than those for others. While August, December, April, and May exports were larger in only four or five years out of nine, September, January, and February exports were larger in eight years, and June exports were smaller in seven years of the nine. Although nine years do not constitute a long period for purposes of statistical analysis, one may conclude tentatively that there are special reasons for exports to differ from shipments in a particular direction during each of the last-named months. It is not within the scope of the present study to venture conclusions as to what these reasons are.

There are other months in which the tendency toward divergence between shipments and exports is larger than would appear from scanning the averages, because, in obtaining an average, divergences in opposite directions cancel each other and their effects are largely lost. Thus, for the month of April the difference between ship-

CHART 1.—AVERAGE MONTHLY NET EXPORTS AND BROOMHALL'S SHIPMENTS FROM ARGENTINA, 1921-22 TO 1929-30*



* Data from Table 10.

ments and exports is frequently large, but the direction is notably variable, since in five years April exports have been larger than shipments, while in four other years shipments have exceeded exports. In this way it happens that average shipments and average exports for April are only half a million bushels apart, as Table 10 shows; but when one averages the nine differences between shipments and net exports in April, without regard to the direction of difference, this average difference is 1.6 million bushels rather than .5 million. Measured in this way the months which show the greatest average difference between exports and shipments are April, January, March, May, and July; differences are 1.6, 1.2, 1.2, 1.0, and 1.0 million bushels, respectively.

One might deduce from a careful scrutiny of Table 10 that some tendency exists for exports to exceed shipments during the six-month period September - February, while during the succeeding six-month period shipments tend to be the larger. But the tendency is not striking. On the whole, the Argentine monthly figures substantiate what may be concluded from a study of annual data. The correspondence between shipments and exports is fairly close on the

average, but greater or less divergences occur from time to time without providing any conclusive evidence as to which series is the more exact. About the same picture of the month-to-month outflow of wheat from Argentina may be secured either from net export or from shipments statistics.

AUSTRALIA

Table 11 shows nine-year averages of official Australian exports and of Broomhall's Australian shipments, with the differences between the two, for each month of the year. These differences range as low as one-tenth, and no higher than seven-tenths,

TABLE 11.—AVERAGE MONTHLY NET EXPORTS AND BROOMHALL'S SHIPMENTS FROM AUSTRALIA, 1921-22 TO 1929-30*

(Million bushels)			
Month	Net exports	Shipments	Difference
Aug.	4.2	4.3	+0.1
Sept.	3.8	3.3	-0.5
Oct.	3.6	3.1	-0.5
Nov.	3.3	3.3	0.0
Dec.	4.5	3.8	-0.7
Jan.	12.8	13.1	+0.3
Feb.	12.7	12.6	-0.1
Mar.	12.6	13.1	+0.5
Apr.	10.0	9.7	-0.3
May	9.3	9.5	+0.2
June	7.0	6.4	-0.6
July	4.4	4.7	+0.3

* Net exports derived from official data, largely as reported by the International Institute of Agriculture. The monthly data do not include a few minor revisions that are taken into account in annual data as shown in Table 6, p. 275. Monthly shipments derived from weekly data as published in the *Corn Trade Yearbook* and the *Corn Trade News*; see text, p. 269.

of a million bushels. Hence, it might appear that a closer correspondence exists between shipments and exports from Australia than is found in the corresponding Argentine figures. However, the sum of the differences between monthly averages is about the same for both countries; and the average difference, obtained by averaging the actual spreads between shipments and exports in the 108 months of the nine-year period, is somewhat larger for Australia than for Argentina. Since the Australian export movement is normally on a smaller scale than the Argentine movement, the existence of larger or even of equal spreads

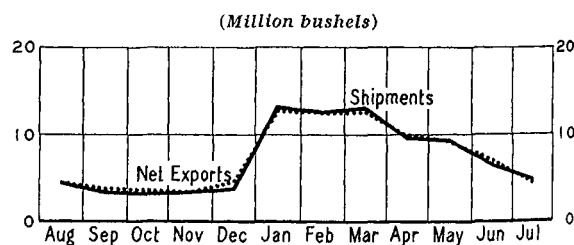
between Australian shipments and exports has a relatively greater significance.

In Australia, as in Argentina, the tendency over the period as a whole is for exports to exceed shipments; but like the Argentine figures, Australian shipments and exports alter their relative positions from month to month in an irregular way.

The nine-year average shows a regular (though by no means a conspicuous) alternation from December to July, but such regularity is not found in a particular year. Average exports exceed average shipments in six months, while in five months the shipments average the larger, and in one month, November, the two are equal. Few of these relationships, however, appear to be markedly typical of those prevailing in individual years. June is an exceptional month in this regard, since its exports exceed shipments in eight of the nine years. September and October exports each exceed shipments in seven years. One does not find a month in which shipments exceed net exports in as many as seven of the nine years, though in January and July shipments are larger than net exports in six of the nine years.

Chart 2 shows that, as in Argentina, the Australian averages for shipments and

CHART 2.—AVERAGE MONTHLY NET EXPORTS AND BROOMHALL'S SHIPMENTS FROM AUSTRALIA, 1921-22 TO 1929-30*



* Data from Table 11.

exports follow much the same course throughout the year. Nevertheless, there is an average monthly difference of nearly a million bushels between the two.¹ An average difference of more than a million bushels is found in six of the months, the

¹ This difference is secured by averaging the nine August differences, the nine September differences, and so on for the other months, without regard to the direction of differences, and then dividing by twelve the sum of these monthly average differences.

greatest, 1.7 million bushels, occurring in March. In view of the fact that both shipments and exports average only a little over seven million bushels monthly, these differences appear considerable. The absence of land frontiers or the inclusion of shipments from other countries, which complicates the Argentine data, makes it seem reasonable to suppose that there are duplications, omissions, or a lack of precision as to time in one or the other set of Australian figures, possibly in both. For practical purposes, however, either shipments or net exports seem to show month-to-month changes in Australian trade satisfactorily, except when the changes are of distinctly small magnitude.

NORTH AMERICA

As we have seen, average monthly shipments and average monthly net exports from Argentina and from Australia may reasonably be expected to coincide fairly closely, and in fact do so. The month-to-month fluctuations in the outflow of wheat and flour from these countries is described in about the same way either by official or by unofficial statistics, though the two sets of data in particular months exhibit differences of some significance. When, however, we come to consider the average month-to-month fluctuations in the outflow of wheat and flour from North America, the official monthly export statistics as commonly available can hardly be expected to coincide closely with Broomhall's statistics of shipments. The official statistics are not designed to measure the *combined* total overseas movement from North America, but merely the outward movement, whether overseas or not, from the United States on the one hand and from Canada on the other.

Table 12 and Chart 3 (p. 288) show monthly average net exports from the United States and Canada combined in contrast with monthly average shipments. For the average crop year, net exports exceed shipments by some 23 million bushels. If this discrepancy were evenly distributed among the several months, net exports would exceed shipments by about 2 million bushels each month. But the facts are that

net exports exceed shipments by a good deal more than 2 million bushels in August, October, November, and December; and they fall below shipments in January, February, March, April, and July. In August–October, and again in May, some wheat that

TABLE 12.—AVERAGE MONTHLY NET EXPORTS AND BROOMHALL'S SHIPMENTS FROM NORTH AMERICA (THE UNITED STATES AND CANADA), 1921–22 TO 1929–30*
(Million bushels)

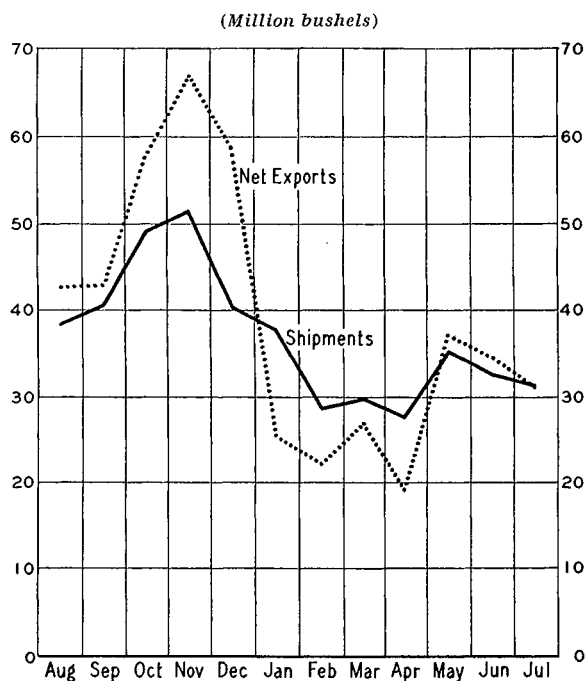
Month	Net exports	Shipments	Difference
Aug.	42.6	38.3	— 4.3
Sept.	42.8	40.6	— 2.2
Oct.	57.7	49.0	— 8.7
Nov.	66.9	51.3	—15.6
Dec.	58.8	40.2	—18.6
Jan.	25.5	37.8	+12.3
Feb.	22.3	28.7	+ 6.4
Mar.	27.0	29.8	+ 2.8
Apr.	19.1	27.8	+ 8.7
May	37.0	35.1	— 1.9
June	34.5	32.5	— 2.0
July	31.0	31.1	+ 0.1

* Net exports are derived from official data (including shipments to possessions) in *Monthly Summary of Foreign Commerce of the United States*, and from *Monthly Report of the Trade of Canada*. Monthly shipments derived from weekly data as published in the *Corn Trade Yearbook* and the *Corn Trade News*.

is reported as exported from the United States in those months accumulates in Canadian positions, so that official export statistics yield figures that are larger than the amount of United States produce that actually goes overseas. In November–April and June–July, the stocks of United States wheat in Canadian positions are reduced, so that the official United States export statistics yield figures smaller than the amount that actually passes overseas. So far as concerns Canada, the official statistics of exports must yield figures larger than the amounts that actually pass overseas in the months of September–December and in May, and smaller in the other months; for in the first-named months stocks of Canadian wheat, reported as exports in those months, are accumulated in the United States, to pass overseas later. Again, the Canadian net export statistics include some wheat that is shipped from Fort William–Port Arthur to Buffalo, and thence re-shipped to Montreal; but the manner in which the stocks of this wheat increase and

decrease at Montreal is not a matter of official record. They may be increased and decreased in much the same way as stocks of Canadian wheat in United States positions are increased and decreased; if so, the Canadian official net export statistics cannot show the month-to-month overseas movement of Canadian wheat for this reason alone.

CHART 3.—AVERAGE MONTHLY NET EXPORTS AND BROOMHALL'S SHIPMENTS FROM NORTH AMERICA (THE UNITED STATES AND CANADA), 1921-22 TO 1929-30*



* Data from Table 12.

Now if precise account were kept (a) of all stocks of Canadian wheat in the United States, (b) of all Canadian wheat in Canada that was reported as an export at Fort William-Port Arthur but was re-routed from Buffalo through Montreal, (c) of all United States wheat in Canada, and (d) of all wheat, both Canadian and United States, that had been reported as an export, but was on passage on the Great Lakes, it might be possible to construct from the official export statistics of the two countries a series that would show how much wheat and flour passed overseas each month from the two countries combined. But the only pertinent stocks statistics that happen to be

available apply (1) to certain but probably not all stocks of Canadian wheat in the United States, and (2) to certain but probably not all stocks of United States wheat in Canada. These stocks statistics seemingly apply to such wheat as happens to be in elevators, not to what happens to be moving by rail and canal from (say) Buffalo to New York, or Port Colborne or Georgian Bay points to Montreal. There appear to be no separate stocks statistics for re-routed Canadian wheat, or for exported wheat in transit on the Great Lakes.

If one applies to the monthly net export statistics such adjustments for changes in stocks as can be made on the basis of available data, a closer approximation is made to what must be the average monthly overseas movement of wheat and flour from North America. Table 13 and Chart 4 show

TABLE 13.—AVERAGE MONTHLY OVERSEAS NET EXPORTS AND BROOMHALL'S SHIPMENTS FROM NORTH AMERICA (THE UNITED STATES AND CANADA), 1921-22 TO 1929-30*

(Million bushels)

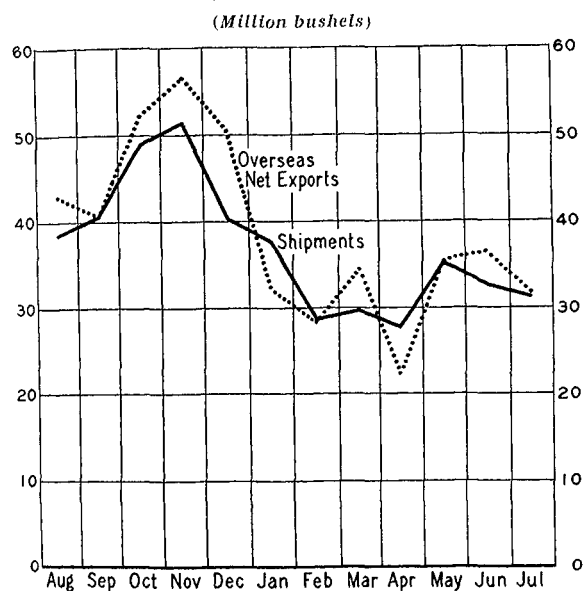
Month	Overseas net exports	Shipments	Difference
Aug.	42.8	38.3	- 4.5
Sept.	40.5	40.6	+ 0.1
Oct.	52.1	49.0	- 3.1
Nov.	56.4	51.3	- 5.1
Dec.	50.6	40.2	-10.4
Jan.	32.2	37.8	+ 5.6
Feb.	28.5	28.7	+ 0.2
Mar.	34.4	29.8	- 4.6
Apr.	22.2	27.8	+ 5.6
May	35.3	35.1	- 0.2
June	36.3	32.5	- 3.8
July	31.6	31.1	- 0.5

* Sources of data as in Table 12, p. 287. The stocks statistics which provide the basis for adjustment of net export statistics so as to reach overseas net exports are to be found in *Canadian Grain Statistics*.

such statistics, again in contrast with Broomhall's shipments. Some of the most striking discrepancies between average monthly shipments and average monthly export statistics are reduced by this procedure. The difference between overseas net exports (as the adjusted net exports may be called loosely) and shipments is much less than the difference between net exports and shipments, particularly in the months of October, November, December, January,

February, and April, and is appreciably greater only with respect to the months of March and June. Nevertheless, large discrepancies remain. Overseas net exports exceed shipments by 4.5 million bushels in August, 3.1 million in October, 5.1 million in November, 10.4 million in December, 4.6 million in March, and 3.8 million in June; they fall below shipments by as much as 5.6 million bushels in January and in April. The differences exceed 10 per cent for the months of August, December, January, March, April, and June.

CHART 4.—AVERAGE MONTHLY OVERSEAS NET EXPORTS AND BROOMHALL'S SHIPMENTS FROM NORTH AMERICA (THE UNITED STATES AND CANADA), 1921-22 TO 1929-30*



* Data from Table 13.

It seems futile to attempt to ascertain precisely why these overseas net exports exceed Broomhall's shipments by large amounts in some months, small amounts in others; or why they fall sometimes a good deal below, sometimes only a little below. One difficulty lies in the fact that the quantities of Canadian wheat sent from Fort William-Port Arthur to Buffalo, and re-routed through Canada, show up in the net export statistics partly in months when these quantities do not actually leave Canada for overseas destinations; this wheat, however, may be reported in Broomhall's shipments as a shipment in the month when

it actually passes overseas. Another difficulty is that the adjustment for changes in stocks is itself an imperfect and incomplete one, since account is not taken of stocks, technically exported, that are afloat on the Great Lakes from either country, or moving by rail and canal in either country, and these may be important at the height of the crop movement. In view of the lack of precise meaning in the series we have called "overseas net exports," one cannot reasonably conclude that this series may properly be used to determine how closely Broomhall's data reflect the month-to-month overseas movement from North America.

As a matter of fact, it seems impossible on the basis of official export statistics to construct a series that would demonstrably be more useful than the overseas net exports (Table 13 and Chart 4) in picturing monthly fluctuations in the outward flow of wheat from North America. One might accomplish this, if given monthly data showing (1) exports by customs districts from the United States; (2) clearances overseas of produce of United States origin from Canadian Atlantic and St. Lawrence ports; (3) exports of Canadian produce overseas from Canadian Atlantic and St. Lawrence ports; (4) exports of Canadian produce overseas from Canadian Pacific ports; (5) records of the overseas movement from Canadian Atlantic and St. Lawrence ports of Canadian produce reported as exported from Canada to the United States, but transshipped at Buffalo later to pass overseas from eastern Canada; and (6) overseas shipments of Canadian produce from Atlantic ports of the United States. Of these six series, the only ones available for the whole period August 1921 to July 1930 are the third, fourth, and sixth, though partial records are available of the first.

Now if one takes (a) total domestic exports¹ from the United States, adjusted for changes in the stocks of United States wheat in Canadian positions, (b) exports from Canadian Atlantic and Pacific seaports, (c) shipments of Canadian produce

¹ It should be noted that "domestic exports" from the United States include flour milled in bond in the United States from wheat produced in Canada.

from Atlantic ports of the United States, and (d) a rough estimate of the overseas clearances from eastern Canada of Canadian wheat first exported from Fort William-Port Arthur to Buffalo, and then sent back to Canada, the total might more or less represent average monthly exports from the noncontiguous boundaries of the United States and Canada. For what it may be worth, such a series is shown in Table 14 and Chart 5, in contrast with Broom-

TABLE 14.—AVERAGE MONTHLY "ADJUSTED OFFICIAL CLEARANCES" AND BROOMHALL'S SHIPMENTS FROM NORTH AMERICA (THE UNITED STATES AND CANADA), 1921-22 TO 1929-30*
(Million bushels)

Month	Adjusted official clearances	Shipments	Difference
Aug.	43.7	38.3	-5.4
Sept.	42.4	40.6	-1.8
Oct.	47.8	49.0	+1.2
Nov.	50.1	51.3	+1.2
Dec.	44.9	40.2	-4.7
Jan.	37.4	37.8	+0.4
Feb.	30.9	28.7	-2.2
Mar.	35.1	29.8	-5.3
Apr.	25.3	27.8	+2.5
May	32.8	35.1	+2.3
June	37.6	32.5	-5.1
July	34.6	31.1	-3.5

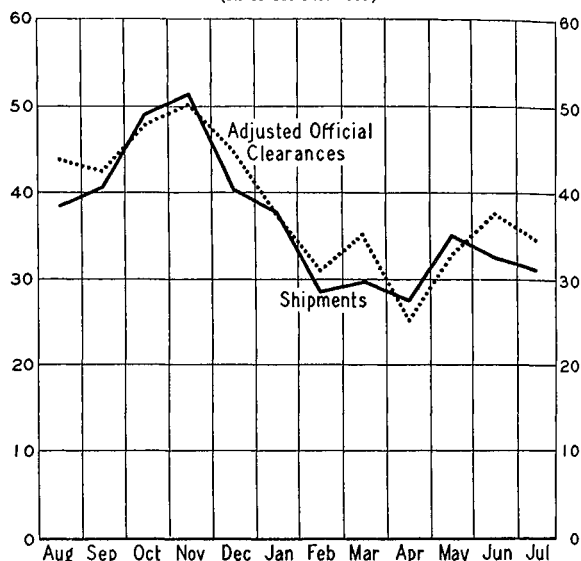
* "Adjusted official clearances" based upon official data from *Monthly Summary of Foreign Commerce, Canadian Grain Statistics*, and *Report on the Grain Trade of Canada*; see accompanying text for a description of the several series entering into the calculation. Monthly shipments derived from weekly data in the *Corn Trade Yearbook* and *Corn Trade News*.

hall's shipments. The monthly movement of this series, which for convenience we may call "adjusted official clearances," differs a good deal from what is shown by overseas net exports (Chart 4) and by Broomhall's shipments. But it seems unlikely that this series represents at all precisely the outflow of wheat and flour from North America. The "adjusted official clearances" involve a considerable element of estimate;¹ they are also calculated with the aid of an adjustment for changes in stocks that is presumably inadequate.² Since this series can hardly be accurate itself, little is to be gained in an attempt to compare it with Broomhall's shipments.

Fairly good evidence earlier appeared to show that Broomhall's shipments under-

state the outflow of wheat from North America over a period of years or in a particular year; what is lacking is evidence to show whether or not the understatement is

CHART 5.—AVERAGE MONTHLY "ADJUSTED OFFICIAL CLEARANCES" AND BROOMHALL'S SHIPMENTS FROM NORTH AMERICA (THE UNITED STATES AND CANADA), 1921-22 TO 1929-30*
(Million bushels)



* Data from Table 14.

concentrated in particular months. On the whole, it seems improbable that the understatement is notably concentrated. No notable concentration appeared with regard to the discrepancies between Argentine and

¹ This is with respect to the overseas clearances of such wheat as is originally reported as exported at Fort William-Port Arthur, which passes to Buffalo and then back to Canada. Even the total quantity of this wheat is not on record for all of the nine years 1921-22 to 1929-30, though it can be estimated roughly as about 20 million bushels a year on the average. One can only make an assumption as to how much of this quantity went overseas in each month, basing the assumption on the manner in which overseas shipments of all Canadian wheat passed out of Montreal on the average over the five-year period 1924-25 to 1928-29; this was the procedure employed in calculating the "adjusted official clearances" shown in Table 14 and Chart 5.

² This adjustment involves a correction of United States domestic exports (plus shipments to possessions) to allow for the increase and decrease of stocks of United States wheat in Canada. Only such United States wheat as is in Canadian elevators, however, is accounted for in these statistics; the amount moving on the Great Lakes or by rail and canal in Canada is not included. Hence, the adjustment is imperfect.

Australian shipments and net exports. Moreover, if we compare two series that deal specifically with overseas shipments from North America—Broomhall's shipments and *Bradstreet's* clearances—we find that these series show very much the same movement from month to month, as is illustrated by Table 15 and Chart 6. This cor-

TABLE 15.—AVERAGE MONTHLY CLEARANCES (*Bradstreet's*) AND SHIPMENTS (BROOMHALL'S) FROM NORTH AMERICA, 1921-22 TO 1929-30*
(Million bushels)

Month	Bradstreet's clearances	Broomhall's shipments	Difference
Aug.	36.6	38.3	+1.7
Sept.	38.7	40.6	+1.9
Oct.	47.6	49.0	+1.4
Nov.	49.5	51.3	+1.8
Dec.	37.6	40.2	+2.6
Jan.	34.1	37.8	+3.7
Feb.	25.0	28.7	+3.7
Mar.	27.0	29.8	+2.8
Apr.	24.8	27.8	+3.0
May	32.5	35.1	+2.6
June	32.4	32.5	+0.1
July	29.5	31.1	+1.6

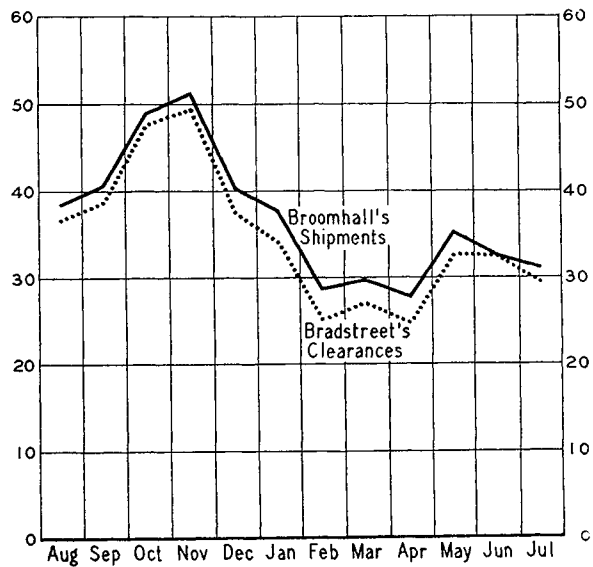
* Monthly clearances derived from weekly data as published in *Bradstreet's*; monthly shipments derived from weekly data as published in *Corn Trade Yearbook* and *Corn Trade News*.

respondence is significant because the data are gathered independently by Broomhall's and *Bradstreet's* organizations. Nor does any feature of the average monthly course of Broomhall's shipments appear to be notably in disaccord with what is known qualitatively of the outward movement from North America. One expects shipments to be smallest in February-April, while lake and St. Lawrence navigation is closed and the Southern Hemisphere crop movement is at its height; one expects a spring peak in May with the opening of navigation, and a downward drift in June and July as the Canadian movement tapers off and before the United States movement begins; one expects shipments to increase in August-November as the United States and Canadian crops are successively harvested; one expects a decline after November when lake navigation closes and as the post-harvest export movement subsides. It may be difficult to determine precisely why shipments on the average should decline

more between November and December than between December and January; but this is comprehensible when we observe that the dates when the last vessel departed for sea from Montreal were not later than December 9 in any of the nine years under review. Similarly, a larger average decline in shipments between January and February than between December and January does not appear unreasonable in view of the normal tapering off of the post-harvest export movement, and in view of the lesser number of days in the month of February.

All told, therefore, it seems proper to conclude not only that Broomhall's shipments provide the best available picture of the

CHART 6.—AVERAGE MONTHLY CLEARANCES (*Bradstreet's*) AND SHIPMENTS (BROOMHALL'S) FROM NORTH AMERICA, 1921-22 TO 1929-30*
(Million bushels)



* Data from Table 15.

month-to-month outflow of wheat and flour from North America, but also that the picture cannot seriously misrepresent the facts. Some misrepresentation, however, is probable if only because shipments appear to understate the total outward movement. It would hardly be justifiable to attempt to advance detailed and closely reasoned explanations of the smaller month-to-month changes in Broomhall's shipments from North America, for one would run the risk of ascribing reasons for an event that did

not in fact occur. The fact appears to be that the outflow of wheat and flour from North America in a given month or week is not measured precisely by any statistical series; errors in particular measurements may easily exceed 5 per cent. But the broad course of the movement over a period of several months is apparently described better by Broomhall's data than by other series, and is described with sufficient accuracy for many purposes.

OTHER COUNTRIES

Net exports from other countries than Argentina, Australia, and North America, as we have seen, exceeded Broomhall's shipments from a similar (but not identical) list of countries by some 13.6 million bushels a year on the average over the period 1921-22 to 1929-30.

It is impossible to ascertain whether this average annual discrepancy is distributed evenly over the twelve months of the year, or whether on the other hand it

is concentrated in particular months. Monthly net export statistics covering the entire period are available only for India, Hungary, and Poland; the data for Russia, Roumania, Jugo-Slavia, Bulgaria, Algeria, Morocco, Tunis, Spain, and Chile are either incomplete or unpublished. Perhaps the discrepancy, if measured, would be found to be concentrated rather more in the summer and fall—say July-December—than in other months of the year; for it is principally overland shipments from Hungary and Jugo-Slavia that seem to be omitted from Broomhall's statistics, and total shipments from these countries appear to be concentrated in the post-harvest months. Yet it is also possible that the overland movement from these countries varies only a little from month to month, and hence Broomhall's omission of these overland shipments in earlier years may have affected the picture of the outflow of wheat from "other countries" only in very slight degree.

IV. SUMMARY AND CONCLUSIONS

The most widely employed statistics purporting to measure the volume of world trade in wheat and flour are unofficial statistics, published in Broomhall's *Corn Trade News*. In general, the attempt is made in these statistics to measure the outflow of wheat and flour from all countries where the flow is of significance. The list of countries from which the outflow is measured changes from year to year, and also from month to month.

Comparisons of crop-year statistics of Broomhall's shipments and of the net exports of net exporting countries show that net exports have exceeded shipments by approximately 38 million bushels a year on the average over the nine years 1921-22 to 1929-30, or by approximately 36 million bushels if allowance is made for changes in the year-end stocks of wheat (previously reported as exported) in the United States and Canada. The discrepancy seems to arise principally because account is not taken of some of the wheat and flour moving from North America, and of some of the wheat and flour moving from Hungary and Jugo-Slavia. The fact that annual dis-

crepancies have tended to diminish from year to year suggests that the scope of Broomhall's service has been progressively widened.

In some years Broomhall's shipments from Argentina exceed Argentine net exports, and in other years fall below. The discrepancies have never been large. The close correspondence is partly fortuitous, however, if the shipments statistics cover fully the outflow of wheat from Uruguay. Australian net exports do not coincide so closely with shipments from Australia. In percentage terms the discrepancies are in some years strikingly large. In the first five of the nine years net exports appreciably exceeded shipments; in the last four years shipments were appreciably the larger.

Difficulties arise in the comparison of shipments and net exports from North America (the United States and Canada) on account of the manner in which United States wheat is exported via Canada and Canadian wheat via the United States, and the way in which Canadian wheat moves to the United States and back through Canada for export. Shipments, however, each

year have fallen below net exports or overseas net exports. There appears to be no sound foundation for the view that the official statistics involve double counting, thus overstating the overseas movement; consequently, it seems probable that Broomhall's data do not account fully for the movement. Clearances as published by *Bradstreet's* understate the movement still further.

Such imperfect comparisons as are feasible suggest that Broomhall's data understate the annual outflow of wheat from India and Russia slightly, and from Hungary and Jugo-Slavia considerably.

Average monthly net exports and shipments coincide rather closely, but not precisely, so far as concerns Argentina and Australia; one's notion of the month-to-month outflow of wheat and flour from these countries would not differ significantly whichever set of statistics was employed. So far as concerns Canada and the United States, a trustworthy picture of the outflow from noncontiguous boundaries cannot be obtained from available official statistics. There seems, however, no good reason to suppose that Broomhall's data seriously misrepresent the actual monthly movement; but it would be unwise to assume that the smaller changes in monthly shipments necessarily represent a change that actually occurred. Much the same may reasonably be said of Broomhall's statistics

of monthly shipments from the minor exporting countries, though even an approximate comparison of monthly net export statistics with shipments is not feasible on account of the lack of official data.

If one wishes to study short-time fluctuations in the total flow of wheat from exporting to importing countries, it therefore seems clear that Broomhall's shipments provide the best available statistical series. Official monthly export statistics are lacking for many of the smaller exporting countries (counting Russia among these for the moment); and the available official statistics of the United States and Canada cannot at present afford a series that represents the outflow from North America with sufficient precision. Broomhall's data, however, would require to be employed somewhat cautiously in such a study. The evidence is convincing that these data cannot precisely represent the total quantities of wheat exported overseas from month to month; the figure for any month will be approximate — perhaps somewhat too large, perhaps somewhat too small. An indicated change in shipments from one month to another of 3 or 4 million bushels, possibly more, may not represent a change that actually occurred; but larger changes presumably reflect a real alteration in the volume of trade, and the general drift of trade over a period of several months is sure to be indicated by Broomhall's data.

This study is the work of M. K. Bennett and Ada F. Wyman

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