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Source: *Journal of the Royal Statistical Society*, Vol. 69, No. 2 (Jun., 1906), pp. 321-373

Published by: Wiley for the Royal Statistical Society

Stable URL: <http://www.jstor.org/stable/2339525>

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DEALINGS *in FUTURES on the COTTON MARKET.*¹

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[Read before the Royal Statistical Society, 24th April, 1906.]

Sir FRANCIS S. POWELL, Bart., M.P., Hon. Vice-President, in the Chair.]

THIS paper is an attempt to throw further light on the question of the effects of speculation upon prices in highly-developed markets. The market selected for examination is the cotton market. In the cotton market, as in many other produce markets, speculation is so organised that transactions may be entered into easily for periods ranging up to about ten months ahead. Dealings of this kind are generally termed "futures."

The nature of "futures" and their varieties have been described before, but as few are familiar with them, some words of explanation are given below. "Futures," generally regarded, may be ordinary "futures," "options," or "straddles." The "future" proper is a sale of cotton on the basis of a fixed grade for some stated time in the future at a present price. They are quoted for about ten months ahead, and each, after present month "futures," culminates in two months which define the period within which deliveries must be made. Thus on any day in January "futures" will be quoted, as a rule, for January, January-February, February-March August-September, September-October. The seller, say, of August-September "futures" must deliver cotton against his contract within August or September. He may tender various kinds of cotton, allowances, which are fixed by arbitration, being made for grades below "middling" up to and including "good ordinary," and value being added for grades above. At one time no grades below "low middling" were tenderable. Weekly settlements of differences are customary between brokers, and frequent between brokers and their clients. With "options" we shall be concerned scarcely at all here. They are single, "puts" or "calls," or double, alternative "puts" or "calls." The "put" is a power to deliver cotton at some time in the future at a price fixed in the present, which need not, of course, be exercised. The "call" is similar, but relates to buying. It will be evident that the "put" is a hedge

¹ The authors desire to express their obligations to Mr. R. J. Allen and Mr. J. Audley for information, and to Messrs. J. H. Higgins, J. F. Holdsworth, A. F. Jack and C. H. Mercer for assistance in preparing some of the tables and diagrams from which calculations were made.

against prices falling, and the "call" a hedge against their rising. The basis of "options" is the same as that of ordinary "futures." The price of "options," of course, varies. A "straddle" is a speculation on the difference between the prices of nearer and more distant "futures," which is a variable, or on the difference between the prices of different qualities of cotton. With the conveniences which "futures" offer to spinners, brokers, and exporters, we need not deal here.²

Cotton is always quoted "points on" or "points off" "near month futures." The considerations which determine the "points on or off," other than those of the daily quoted "spot," may be taken roughly as three:—

(1) *The Grade, i.e., the colour, cleanliness, &c., of the cotton.*—This is of importance owing to the necessity of cleaning machinery being adapted to the condition of the cotton. The lower the grade the more elaborate and expensive is the machinery required to clean it, and consequently a spinner is willing to pay a certain amount extra for cleaner cotton in order to save expenditure on cleaning machinery.

(2) *The Length of the Staple.*—This determines to a large extent the fineness of the yarn which can be spun. Only the very lowest counts can be spun from cotton with "no staple," that is with a fibre of about three-quarters of an inch, and the longer the staple above that minimum the higher the counts which can be spun.

(3) *The Growth.*—The best American cotton (Sea Island and Florida cotton are always considered quite apart) is grown in the

² A fuller account of "futures" and of the use made of them will be found in the authors' paper in the *Economic Journal* for December, 1904, Ellison's "Cotton Trade of Great Britain," and chapter 7 of Chapman's "Lancashire Cotton Industry." We are tempted to give here one particular instance of the use of "futures" which we have not seen in print elsewhere. The peculiarity of Chinese orders—and China is a most important market—is that they tend to accumulate and are only placed when the exchanges become favourable. Hence no less than one-twentieth of the annual Chinese orders may actually be given on the same day. If the cotton market were not highly developed, the English spinners would be obliged either to assume the risk of the price of cotton rising before the orders had to be executed, or to buy cotton at once in order to cover their orders from the manufacturers. If they pursued the second course the price of cotton would, as a rule, be forced up temporarily. As it is, many spinners cover directly or indirectly through their brokers by means of "futures," and the demand is distributed over a lengthy period. Were there no organised system of "future" dealings, brokers would, no doubt, be prepared to assume the risks noticed above at a price, but the cost of concentrating risks in this way should be much reduced by facilities being provided for the broker to pass on to other experts the whole or part of his risks.

Mississippi Valley, the next best in Texas, and the poorest on the Uplands (*i.e.*, Georgia and Alabama). Considerations of growth determine to a great extent the hardness or softness, and strength or weakness, of the fibre, and thus, indirectly, whether the cotton is suitable for warp or weft.

When the spinner has informed the dealer exactly what quality of cotton he wants, the dealer quotes in "points on or off." According as the spinner wants immediate delivery or delivery in some future month, he pays the price of current "futures," or of "futures" of the month in which he wants delivery, plus or minus the "points on or off" previously fixed. The future quotations used in England are those prevailing in Liverpool at the time of the purchase. They refer to Upland cotton of middling grade, of "no staple" and of the worst growth. Except on days when there is actually no business being done, the prices are continually moving a few points first one way and then the other. The frequency of oscillation varies with the excitement of the market: the fluctuations of "near month futures" on a certain day when the net drop was 33 points and the range 59 points (namely, 8.45 to 7.86), *i.e.*, when the change taking place was considerable, numbered nearly 150. The "spot" quotations published daily which refer to the same grade of cotton are fixed by a committee according to the condition of the market, and its work is much more difficult than might appear at first sight. The cotton represented by the quotation is very little dealt in on the Liverpool market, as the poorest qualities are not much spun in Lancashire. As a result of this, the exact number of "points "on or off" frequently cannot be ascertained, and consequently the quotations are to some extent nominal. The "spot" quotations are, therefore, only a general index of the movement of prices of cotton, and must not be taken to show at all accurately the prices of any particular kind of cotton. For example, after the size of the 1904-05 crops became known, and the Americans attempted to hold back cotton, the "points on" for many qualities rose considerably owing to artificial scarcity, though the price of cotton, as indicated by "spot," remained low. We may remark in passing that there is a tendency for cautious spinners in England to take no risk and to fix the price of their yarn in accordance with quotations made by the dealers for actual cotton of a specified quality.

A word must be said with regard to the comparative mobility of "future" and "spot" prices. Generally speaking, the prices of futures are moving up and down all day long, and theoretically, owing to the manner in which spot is quoted—*i.e.*, by "points

“on or off” current futures—“spot” is doing likewise. Practically it is doing nothing of the kind, as deals in “spot” do not take place on all the occasions on which deals are effected in futures. We have already given reasons for supposing that, were all transactions in “spot” and futures recorded, it would be found that the “spot” market was much the more immobile.³ An impression of this being so used to be given by the quotation of “spot” in one-sixteenth of *rd.*, and of “futures” in halves of sixty-fourths. Both sets of official Liverpool quotations for American cotton are now made in one-hundredths, though jobbers will quote halves and even quarters of one-hundredths.

The various series of “futures” prices or “spot” prices dealt with by us, therefore, (whether daily, weekly, or fortnightly quotations) are not complete records of what happens, and the question to be decided in each case is, whether they are adequately typical for the end in view. The count of frequency of movement in “spot” from daily quotations, for instance, (see table on p. 336) may lead to erroneous conclusions, because, on the one hand, movements are reckoned which are merely nominal, owing to the method of quoting “spot,” and, on the other hand, the market may close one day at the same price as on the previous day, though there may have been intermediate oscillations. Probably, however, the chance of error is slight if the frequency of movement (so counted) in one place is used only in relation to the frequency of movement in another place. To this question we shall not recur, since to justify the use of each series employed by us would occupy too much space; we may remark, however, that the averaging of daily or weekly quotations (assuming an adequate number of figures to be covered by the average) probably yields almost the same results as averaging all the quotations over the same period.

Great difficulties confront the investigator who attempts to gauge the influence of “futures” on prices, as the problem stated at the beginning of this paper may be shortly described. The deductive argument, which relies on the probability that an expert speculator will guess right more frequently than wrong, breaks down because “cornering”⁴ and fictitious operations to mislead are possible, and the public is drawn into dealing on the market. The public is apt to be influenced as a crowd, to give way to panic or become unduly sanguine, and the law of error,

³ *Economic Journal*, December, 1904. For example, more deals take place in “futures” and there is more scope in the future market for reasoned imagination.

⁴ We need not pause to point out how “cornering” is facilitated by the existence of “futures.”

therefore, does not apply closely to its actions over short periods. If it did, the ignorance of the public would have no effect one way or the other. Again, the inexpert may easily be misguided by "bulling" and "bearing" operations. Unquestionably the general public speculates largely to-day on produce markets (in what degree exactly we do not know), and syndicates tamper with the market for their private ends (again we do not know in what degree). We must conclude, therefore, that prices may be unsteadied by the use of "futures."⁵ If experts alone speculated and never tried to create corners, and other dealers were not misled by "bulling" and "bearing," we should expect prices on the whole to be smoothed, but the frequency of movement to be increased. Expressed more in detail, with "futures" in use, in these circumstances we should look for a diminished range of movement, less deviation in movement (apart from small oscillations), less variation from the average, but an increased number of movements. With the exception of the last, these are the effects in general that are meant by us when we speak of prices being steadied, and as to the last, some would regard prices as steadier when, other things being equal, the frequency of movement increased. Apart from frequency of movement it is evident that the community is benefited by prices being steadied, but it must be remembered that big changes by small increments are frequently less harassing than smaller changes by larger increments. From this it follows that no one index of oscillation, such as the standard deviation, the mean daily movement or the average movement, will afford a correct notion as to whether the character of market fluctuations is improving or not when judged from the standpoint of social expediency.⁶

⁵ We do not propose to notice here the opinion that "futures" regularly inflate prices, or the equally prevalent view that they regularly depress prices.

⁶ To indicate the range of movement we have taken the space between the highest and lowest quotations. The defect of this measure is that one or both of the quotations selected might be caused accidentally and really lie quite out of relation to the rest of the prices of the year. The investigator must be on his guard against using a quotation of this kind. The "modulus" is naturally thought of as the proper index to show the contraction or dispersion of a series about its mean, but for our purpose something further was required, as it has not been proved that the series with which we are dealing conform closely to one law. The "standard deviation," which is deducible from the "modulus," is also used by us, as a rule, it will be observed. For the guidance of those who are not conversant with these technical expressions, we may point out that the "standard deviation" is more suitable as a general measure of steadiness in prices than the average error, because in the former more weight is attached to the "spread" or dispersion of quotations about their mean. By the average error we mean the sum of the differences

We have stated above that the degree in which the market is tampered with by powerful interests to serve their own ends, and prices are thereby unsteadied, is practically unknown. By "tampering" we mean, in addition to cornering, "bulling" with a view to selling or "bearing" with a view to buying, the intention of operators being to make a profit out of misleading the market. Such tricks are naturally played in secret as much as possible. Frequently, however, the existence of dealing syndicates becomes known, but it does not follow that they tamper with the market; they may expect a profit from acting legitimately in opposition to common impressions. It is impossible to find out how frequently appreciable tampering with the market takes place generally; but it is possible in some measure to test the allegation that attempts to create a "squeeze," that is, to "corner" the tail end of the crop, are common. The magnitude of the operations required for creating a squeeze is not so vast as to render success exceedingly unlikely, and, if the new crop is delayed for any reason, large profits may be reaped. We know pretty well what the effect of a successful squeeze would be upon the general course of prices, but unfortunately it cannot be distinguished from the effects caused by mistakes in estimating demand. We may hope, however, to get some rough support for, or refutation of, the supposition that the tail end of the crop is frequently cornered, by comparing relative prices in the autumn over a number of years with a rough *à priori* probability. In Diagram I we have given weekly quotations for each year from 1881 up to the beginning of 1904 and set them over one another so that the autumn quotations for each year may lie roughly on the same verticals; the new crop, it must be remembered, begins to come into sight about September. This diagram should be read also in the light of the tables at the end of this paper, showing the relations between the prices of different years which are hidden somewhat by the form of Diagram I. It will be seen

between the quotations and the average price divided by the number of quotations, *i.e.*, $\frac{\sum \delta}{n}$, where δ stands for the differences between the prices and

their average. The formula for the standard deviation is $\sqrt{\frac{\sum \delta^2}{n}}$ and that

for the modulus is $\sqrt{\frac{2 \sum \delta^2}{n}}$. We have been compelled to use "mean daily movements" in addition (*i.e.*, the average differences between daily quotations, the directions of the movements being ignored, and zeros being reckoned as differences), because two series with the same standard deviation might have quite different mean daily movements. Further, in one place we have thought it worth while to distinguish between the mean daily movement and an "average movement," in the calculation of which zero changes are disregarded.

DIAGRAM I.

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that it was only in 1881, 1889, and 1900—and in a less degree in 1882—that the autumn prices had a level significantly higher than the preceding and succeeding prices. The high prices in September, 1888, and in August and September, 1896, were carried on into October, so they are probably to be explained by false estimates of the new crop or of the demand for it. It must be borne in mind, in interpreting these facts, that mistakes in dealing with the old crop might easily cause temporarily high prices in the autumn, but could not so easily cause temporarily low prices, since, estimates having been made of the new crop, surpluses would be held up in August and September instead of being sold at a probable sacrifice. It appears to us that no case can be made out statistically from the events of the last twenty-three years for the frequent creation artificially of a squeeze in the autumn. The same statement may be made as to the preceding sixteen years (1864-80), which we also examined, though it seemed to us unnecessary to construct another diagram.

A general inductive line of argument is as little convincing with regard to the effect of "futures" on prices as the deductive argument. A direct comparison of the prices of "futures" with "spot" price is subject to the obvious objection that the "spot" prices are affected by the prices of "futures" and the latter are affected by the former. It is impossible to discover what "spot" prices would have been without the influence of "futures" so as to compare these with the quotations of "futures." A very high degree of correlation must subsist between the course of "spot" prices and the course of "future" prices. It has been suggested that something might be proved from comparing the quotations of "futures" some time before their currency with the "spot" prices realised when they culminated.⁷ This method reduces to two according to the closeness of the connection between "spot" prices and "future" prices. If the connection is perfect (except for changes in extraneous circumstances, such as the market rate of interest and costs of holding cotton), it comes merely to contrasting the "spot" prices of different times after admitting certain disturbing factors, and therefore it is nothing more than an imperfect examination of oscillations in "spot" prices. If, however, "spot" prices and the prices of "futures" are in some degree independent variables, even apart from the extraneous influences noted above (as we

⁷ See note on p. 542 of vol. xiv of the *Economic Journal* with inference to the investigation on these lines of Cohn, Kantorowicz and Emery. Mr. Stone pursued the same method, among others, in his report on speculation and the prices of Wheat and Cotton for the United States Industrial Commission (vol. vi).

believe them to be), this method becomes a comparison of the independent movements of "futures" with reference to "spot," but a comparison so indirectly drawn that the chance of any results being reached is infinitely remote. The price of April-May "futures" in January may be affected by anticipations of prices in April and May in a degree in which "spot" prices cannot be (which we hold to be the case), but it is practically futile to contrast the price of the April-May "future" in January with "spot" prices in April and May, for though a steady "bearing" of the market might have been at work in January, unsteady influences may have been at work after January. The point is that the effect of anticipation in January cannot be read in "spot" prices after some time has been allowed for the play of other influences. It would be of value, however, to compare the "bulling" or "bearing" influences of "futures" if such operations leave vestiges (as we think they do, sometimes at least), with the state of "spot" prices at the time in relation to the general level of prices, for this would give some idea as to whether "futures" were steady prices or not. This is a line of proof that we shall adopt later. The objections noticed just above, the reader will observe, apply with less force in the case of quotations into the new crop year owing to the breach of continuity in supplies.

A comparison of prices before "futures" were used with present prices yields doubtful results, because of the differences between the economic conditions of the two periods. The changes that have taken place with the increasing use of "futures" cannot be attributed to the "futures" because of other concomitant economic changes. This source of error notwithstanding, we have thought it worth while to quote here Emery's comparison of the highest and lowest prices of the same grade of cotton in New York at different periods, and to supplement these by working out standard deviations, mean daily movements, and the range of movements of weekly quotations of cotton since 1868-69. We succeeded in getting spot prices as far back as 1864, but 1868-69 appears to be the first obviously normal year after the disturbances caused by the cotton famine.

Lowest and Highest Prices at New York.

[In cents per lb.]

Year.	Lowest.	Highest.	Per Cent.	Year.	Lowest.	Highest.	Per Cent.
	Cents per lb.	Cents per lb.			Cents. per lb.	Cents per lb.	
1821.....	11	20	45.0	1856	9	11 $\frac{5}{8}$	22.6
'22.....	10	18	44.4	'57	11 $\frac{5}{8}$	15 $\frac{3}{4}$	26.1
'23.....	9	17	47.0	'58	8 $\frac{7}{8}$	15 $\frac{3}{4}$	43.6
'24.....	11 $\frac{1}{2}$	18	36.1	'59	11	13 $\frac{3}{8}$	17.7
'25.....	12	30	60.0	'60	10 $\frac{1}{2}$	11 $\frac{3}{4}$	10.6
'26.....	9	17 $\frac{1}{2}$	48.6				
'27.....	8 $\frac{3}{4}$	11 $\frac{1}{2}$	23.9	1885	9 $\frac{7}{10}$	10 $\frac{7}{8}$	9.3
'28.....	8 $\frac{1}{4}$	13	36.5	'86	9 $\frac{1}{8}$	10	8.8
'29.....	8	11 $\frac{1}{2}$	30.4	'87	9 $\frac{1}{8}$	11 $\frac{3}{8}$	19.8
1830.....	8	12 $\frac{1}{2}$	36.0	'88	9 $\frac{1}{2}$	11	13.6
				'89	9 $\frac{1}{10}$	11 $\frac{1}{2}$	15.7
1851.....	8 $\frac{3}{4}$	15	41.7	'90	10 $\frac{1}{4}$	12 $\frac{5}{8}$	18.8
'52.....	8 $\frac{1}{2}$	11 $\frac{3}{8}$	25.3	'91	7 $\frac{5}{16}$	10 $\frac{3}{8}$	25.3
'53.....	9 $\frac{3}{4}$	11 $\frac{3}{4}$	17.0	'92	6 $\frac{1}{10}$	8 $\frac{3}{4}$	29.3
'54.....	10	11 $\frac{3}{4}$	14.9	'93	7 $\frac{9}{16}$	10	28.1
'55.....	8 $\frac{1}{2}$	13	34.6	'94	6 $\frac{7}{8}$	8 $\frac{9}{16}$	19.6

The above figures, it should be noted, are seriously vitiated, as a basis for inference, because the data are not grouped by crop years. The difference between the average price levels of two crops is frequently large, and when it is, the range of price movements over the calendar year is greatly exaggerated: indeed the former gap may completely dwarf oscillations from the average price of each crop. The percentages are those of the fluctuations from the highest price. The average percentage fluctuations were 40.79 for 1821-30, 25.41 for 1851-60 and 18.83 for 1885-94; and the extreme percentages were 60 in the first period, 43.6 in the second, and 29.3 in the third. Taking the figures in six groups of five years each we get the following results:—

	1821-25.	1826-30.	1851-55.	1856-60.	1885-89.	1890-94.
Average percentage fluctuations	46.5	35.1	26.7	24.1	13.4	24.2
Highest percentage fluctuations	60.0	48.6	41.7	43.6	19.8	29.3
Lowest percentage fluctuations	36.1	23.9	14.9	10.6	8.8	18.8
Difference between highest and lowest percentage fluctuation	23.9	24.7	26.8	33.0	11.0	10.5

The last row seems to show that the range of fluctuation to be expected is becoming more constant, which might be due to

improved information, or to crops getting to correspond more closely with demand, or to organised foresight proving more capable of neutralising the effect of any peculiar circumstances which would be liable to cause extreme fluctuation. However, the results as a whole are not convincing, firstly because the era of "futures" is represented by ten years only; secondly because, as regards average percentage fluctuation, the difference between 1821-30 and 1851-60 is as noticeable as that between 1851-60 and 1885-94, which would lead one to attach a great deal of importance to general economic advance apart from the use of "futures;" and thirdly because calendar years are used instead of crop years.

Next we turn to the price movements that have taken place since 1867-68. In the first of the tables that follow, the absolute range of movement, standard deviation and mean weekly movement are set forth for each year. It was important to eliminate the disturbances due to differences between the crops of contiguous years (or, more accurately stated, the disturbances due to variations in the correspondence of these differences with demand)—to this some reference has already been made. We therefore took crop years as our basis; and since the disturbances of accommodation are carried some way into a new crop year, and expectations of a bad or good crop are felt some way back in the old crop year, we confined our calculations to the period between 1st October and 31st July. August and September were eliminated as the months in which fall most of the disturbances caused by discontinuity of supplies.

Table calculated from Weekly Prices between 1st October and 31st July in each Year.

Year.	Average Price.	Lowest Price.	Highest Price.	Range of Movement.	Standard Deviation.	Mean Weekly Movement.
	<i>d.</i>	<i>d.</i>	<i>d.</i>	<i>d.</i>	<i>d.</i>	<i>d.</i>
1867-68 ...	9 $\frac{5}{8}$	7 $\frac{3}{8}$	12 $\frac{7}{8}$	5 $\frac{1}{2}$	1.74	0.31
'68-69 ...	11 $\frac{1}{2}$	10 $\frac{1}{2}$	12 $\frac{5}{8}$	2 $\frac{1}{2}$	0.58	0.19
'69-70 ...	11 $\frac{1}{8}$	7 $\frac{3}{4}$	12 $\frac{3}{8}$	4 $\frac{5}{8}$	0.92	0.23
1870-71 ...	8 $\frac{1}{2}$	7 $\frac{3}{10}$	9 $\frac{3}{10}$	2	0.65	0.17
'71-72 ...	10 $\frac{7}{8}$	9 $\frac{3}{8}$	11 $\frac{1}{2}$	2 $\frac{1}{8}$	0.75	0.15
'72-73 ...	9 $\frac{1}{4}$	8 $\frac{1}{2}$	10 $\frac{5}{10}$	1 $\frac{1}{10}$	0.53	0.10
'73-74 ...	8 $\frac{5}{10}$	7 $\frac{3}{4}$	9 $\frac{1}{8}$	1 $\frac{3}{8}$	0.32	0.10
'74-75 ...	7 $\frac{11}{10}$	6 $\frac{11}{10}$	8	1 $\frac{1}{10}$	0.26	0.07
'75-76 ...	6 $\frac{1}{2}$	5 $\frac{7}{8}$	7 $\frac{1}{8}$	1 $\frac{1}{2}$	0.37	0.08
'76-77 ...	6 $\frac{5}{10}$	5 $\frac{7}{8}$	7	1 $\frac{1}{8}$	0.33	0.11
'77-78 ...	6 $\frac{1}{2}$	5 $\frac{1}{2}$	6 $\frac{9}{10}$	$\frac{1}{10}$	0.21	0.07
'78-79 ...	6	4 $\frac{11}{10}$	7 $\frac{3}{10}$	2 $\frac{1}{2}$	0.67	0.13
'79-80 ...	7	6 $\frac{10}{10}$	7 $\frac{3}{8}$	$\frac{3}{4}$	0.24	0.12

Table calculated from Weekly Prices between 1st October and 31st July—Contd.

Year.	Average Price.	Lowest Price.	Highest Price.	Range of Movement.	Standard Deviation.	Mean Weekly Movement.
	d.	d.	d.	d.	d.	d.
1880-81	6 $\frac{5}{10}$	5 $\frac{3}{4}$	6 $\frac{13}{10}$	1 $\frac{1}{10}$	0.34	0.08
'81-82	6 $\frac{5}{8}$	6 $\frac{3}{8}$	7 $\frac{1}{10}$	$\frac{1}{10}$	0.15	0.07
'82-83	5 $\frac{13}{10}$	5 $\frac{7}{10}$	6 $\frac{5}{8}$	1 $\frac{8}{10}$	0.31	0.07
'83-84	6 $\frac{1}{10}$	5 $\frac{1}{2}$	6 $\frac{7}{10}$	$\frac{1}{10}$	0.20	0.08
'84-85	5 $\frac{13}{10}$	5 $\frac{7}{10}$	6 $\frac{1}{8}$	$\frac{1}{10}$	0.19	0.07
'85-86	5 $\frac{1}{8}$	4 $\frac{3}{4}$	5 $\frac{3}{10}$	$\frac{1}{2}$	0.18	0.07
'86-87	5 $\frac{7}{10}$	5 $\frac{1}{8}$	6	$\frac{7}{10}$	0.28	0.05
'87-88	5 $\frac{3}{2}$	5 $\frac{3}{10}$	5 $\frac{11}{10}$	$\frac{1}{2}$	0.14	0.05
'88-89	5 $\frac{3}{2}$	5 $\frac{5}{10}$	6 $\frac{3}{10}$	$\frac{1}{2}$	0.23	0.06
'89-90	6 $\frac{1}{8}$	5 $\frac{9}{10}$	6 $\frac{11}{10}$	1 $\frac{1}{8}$	0.34	0.08
1890-91	5	4 $\frac{3}{4}$	5 $\frac{3}{4}$	1 $\frac{3}{8}$	0.36	0.06
'91-92	4 $\frac{1}{8}$	3 $\frac{9}{10}$	4 $\frac{15}{10}$	1 $\frac{3}{8}$	0.36	0.07
'92-93	4 $\frac{3}{2}$	4 $\frac{1}{8}$	5 $\frac{5}{10}$	1 $\frac{3}{10}$	0.37	0.09
'93-94	4 $\frac{1}{2}$	3 $\frac{29}{32}$	4 $\frac{11}{10}$	$\frac{25}{32}$	0.22	0.04
'94-95	3 $\frac{3}{8}$	2 $\frac{33}{32}$	3 $\frac{7}{8}$	$\frac{9}{32}$	0.30	0.06
'95-96	4 $\frac{3}{8}$	3 $\frac{3}{4}$	4 $\frac{27}{32}$	1 $\frac{3}{32}$	0.28	0.07
'96-97	4 $\frac{3}{10}$	3 $\frac{25}{32}$	4 $\frac{1}{10}$	$\frac{9}{32}$	0.22	0.07
'97-98	3 $\frac{13}{32}$	3 $\frac{1}{8}$	3 $\frac{13}{32}$	$\frac{1}{8}$	0.18	0.05
'98-99	3 $\frac{9}{32}$	3	3 $\frac{15}{32}$	$\frac{15}{32}$	0.15	0.04
'99-1900	4 $\frac{15}{10}$	3 $\frac{29}{32}$	6 $\frac{1}{10}$	2 $\frac{5}{32}$	0.63	0.12
1900-01	5 $\frac{1}{8}$	4 $\frac{5}{10}$	6 $\frac{1}{2}$	2 $\frac{1}{10}$	0.53	0.13
'01-02	4 $\frac{3}{4}$	4 $\frac{9}{32}$	5 $\frac{1}{32}$	1 $\frac{1}{10}$	0.24	0.09
'02-03	5.35	4.42	7.12	2.70	0.78	0.13
'03-04	7.04	5.78	8.92	3.14	0.91	0.33
'04-05	4.86	3.63	6.01	2.38	0.71	0.15

[Expressed as percentage of average (1st October to 31st July) weekly prices.]

	Range of Movement.	Standard Deviation.	Mean Weekly Movement.		Range of Movement.	Standard Deviation.	Mean Weekly Movement.
1867-68	57.1	18.1	3.22	1886-87	16.1	5.2	0.92
'68-69	18.5	5.0	1.65	'87-88	9.1	2.5	0.91
'69-70	41.6	8.3	2.07	'88-89	15.0	4.0	1.04
				'89-90	18.4	5.5	1.31
'70-71	24.6	8.0	2.09	'90-91	27.5	7.2	1.20
'71-72	19.5	6.9	1.38	'91-92	33.3	8.7	1.70
'72-73	16.9	5.7	1.08	'92-93	25.0	7.8	1.89
'73-74	16.5	3.9	1.20	'93-94	18.4	5.2	0.94
'74-75	13.8	3.4	0.89	'94-95	26.9	8.9	1.79
'75-76	19.2	5.7	1.23	'95-96	25.0	6.4	1.60
'76-77	17.8	5.2	1.74	'96-97	21.6	5.2	1.67
'77-78	11.0	3.4	1.12	'97-98	18.5	5.3	1.47
'78-79	37.5	11.2	2.17	'98-99	14.3	4.6	1.22
'79-80	10.7	3.4	1.71	'99-1900	43.6	12.8	2.48
'80-81	16.8	5.4	1.27	1900-01	42.7	10.3	2.54
'81-82	10.4	2.3	1.06	'01-02	22.4	5.0	1.89
'82-83	20.4	5.3	1.20	'02-03	50.5	14.6	2.43
'83-84	11.3	3.3	1.32	'03-04	44.4	12.9	4.83
'84-85	11.8	3.3	1.20	'04-05	48.9	14.6	3.09
'85-86	14.5	3.5	1.35				

As we have Diagram II before us it will not be necessary to average our results over a series of short periods. It is perfectly evident from the diagram that, though prices might be regarded as generally steadying in some degree over the first twenty years of the period covered by the diagram, they have been getting on the whole unsteadier since. There is an unmistakable upward sweep of every index of unsteadiness in prices since just before the closing decade of the nineteenth century. And even if the indices of oscillation be expressed absolutely, and not as percentages of the average price (on the ground that a movement of one point in price may have the same influence upon dealers whatever the price level, as it is sometimes contended), it will be observed from the first table above that of late years steadiness has diminished.⁸ We are not aware of any significant features in supplies or in demand that would account for these results, though we can imagine that when crops are unusually large or small unsteadiness might be caused by ignorance as to the equilibrium price under such conditions. It is strange, however, as regards this point, that both the absolute and relative (to price) standard deviations were low in the good years of 1897-98 and 1898-99, though the relative standard deviation was abnormally high in the year 1894-95, when the crop was big. But the aspect of the market is said to have been changed of late by the growing prominence of dealing syndicates

⁸ In response to points raised by Mr. Hooker in the discussion, we have on reflection slightly altered our wording here and on p. 334, and now draw some attention to the absolute variations, though we still incline to the view that the percentage ones are the more important. But certainly it might plausibly be contended, when the working of speculation is being considered, that the dealer is influenced by movements measured in "points" and not in percentages of price. We are not satisfied that he is, but admit that he might be. On the other hand, assuming that the dealer does not think of percentage movements, it might be urged that when price is high less cotton is sold, that the transactions per head are therefore less, and that the dealer with a restricted volume of business is less affected by a movement of one "point" in price. According to this argument the value of the "point" movement as a market force would vary directly as the amount of business done, which varies inversely as the general price level. The calculation, under these assumptions, of the value of the "point" movement, as a market force, obviously requires a knowledge of the demand function. If "standard deviations" varied as the level of prices, the suitability of expressing the former as percentages of price would be proved, though if they did not the contrary would not be proved, since it is beyond dispute that "standard deviations" are determined by other causes also. We have therefore correlated "standard deviations" with average prices, taking several short periods for obvious reasons. The results do not help us out of our difficulty; they are as follows, the first number being the coefficient of correlation, and the second, in brackets, its probable error:—1867-75, + .36, (.2); 1875-85, — .018, (.2); 1885-95, — .19, (.2); 1895-1905, + .81, (.07).

DIAGRAM II.

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and by the greater extent to which the public gambles on produce exchanges. Of the former, if the rise of the syndicate must be admitted, the cause need not be an increase of the gambling spirit, but may be merely general development in the money market and commercial affairs which renders financing easy and natural. It is demonstrable by deduction that the powerful syndicate which tampered with the market to make a profit would, *cæteris paribus*, unsteady prices, and it is probable that increased gambling by the public would have the same, if less, effect; it is said that the public is speculating more in "futures," and that the part played by powerful syndicates has enlarged; it is known that the market is tampered with; and prices have been getting unsteadier. This is not certain proof, but it seems to establish some probability. It cannot be inferred of course that prices would be steadier if "futures" were not used at all, and it must be remembered that "futures" might be worth retaining, because of the facilities they afforded for the shifting of risks, even if they increased them.

It will be interesting to compare the above results with those reached by the committee of Section F of the British Association, which reported upon Future Dealings in Raw Produce in 1900, and confined its attention almost exclusively to the wheat market, but did not give any special attention to the question whether the effects of speculation had altered of late years. In the report the outcome of an examination of the Gazette weekly prices of English wheat is given as follows:—

Gazette Average of English Wheat.

Period.....	1850-59.	1860-69.	1870-79.	1880-89.	1890-99.
	s. d.	s. d.	s. d.	s. d.	s. d.
Average price s. d. per quarter	53 4	51 9	51 5	37 —	28 9
Standard deviation	4 4 $\frac{1}{2}$	4 1 $\frac{1}{2}$	3 10 $\frac{1}{2}$	1 11 $\frac{3}{4}$	2 6 $\frac{3}{4}$
Mean weekly movement.....	— 10 $\frac{1}{8}$	— 8 $\frac{3}{8}$	— 7 $\frac{3}{8}$	— 5 $\frac{3}{8}$	— 5 $\frac{1}{8}$

"The gradual narrowing of the range of variation is a noteworthy feature of the table. The fact that, considered as a percentage of the price, the variability has hardly been reduced is equally noteworthy; but it is a disputable point whether the actual money amount of the variability is not rather to be taken into account than the percentage variability. Attention may be specially called to the fact that, except for the disturbance due to the Leiter corner, the period of comparative stability in the Gazette average price, stability in the sense of freedom from violent fluctuations, sets in precisely at the time when the

“organisation of the futures markets had reached that stage to which their opponents attribute malign results.”⁹

We think that for our purposes the indices of price movements ought to be expressed as percentages of the average price, and no reason is advanced in the report for the opposite view. Expressing the results as percentages,¹⁰ we obtain the following :—

	1850-59.	1860-69.	1870-79.	1880-89.	1890-99.
Standard deviation expressed as percentage of average price	8.14	7.91	7.50	5.35	8.91
Mean weekly movement expressed as percentage of average price	1.70	1.35	1.20	1.27	1.48

Here are revealed a considerable rise of the standard deviation over the last decade considered and a rising tendency in the mean weekly movement over the last two decades. The increase in the absolute standard deviation shown in the first table is not of much significance in view of its amount, and of the very exceptional conditions of 1898.

We now pass on to notice another method of investigation that has been employed, namely, the method of difference.

This method cannot be applied with any confidence even when for the same commodity there are markets without “futures” as well as markets with “futures,” because the markets will be in telegraphic communication (which may almost completely destroy the individuality of each), and different kinds of demand may operate in the two cases.¹¹ However, in spite of these defects, we have made a slight comparative analysis of price movements at Liverpool, New York, New Orleans, Havre, and Bremen, which are the chief cotton markets. At Bremen there are no dealings in “futures,” and the

⁹ British Association “Report on Future Dealings in Raw Produce,” pp. 11 and 12.

¹⁰ See note on p. 332.

¹¹ A sudden change in a market, in respect of its use of “futures,” would afford more suitable conditions for the application of the method of difference. Such a change occurred in connection with the Berlin produce exchange, and Mr. Hooker and Professor Flux seized the opportunity to get all the information they could from the events that followed, but, as the period of the disuse of “futures” in corn dealing in Berlin was so short and all the surrounding changes could not be gauged adequately, Mr. Hooker admitted in his paper to this Society that his conclusions were probable only.

quantity of dealing at New Orleans and Havre is much less than at Liverpool and New York. We have not thought it worth while in this case to go to the trouble of calculating standard deviations.

*Average Movement.**

[Expressed in pence per lb. avoirdupois.]

Year.	Havre.	New Orleans.	New York.	Liverpool.	Bremen.
	<i>d.</i>	<i>d.</i>	<i>d.</i>	<i>d.</i>	<i>d.</i>
1900-01	0·059	0·053	0·068	0·064	0·050
'01-02	0·047	0·046	0·043	0·049	0·050
'02-03	0·049	0·058	0·070	0·056	0·048
'03-04	0·110	0·107	0·131	0·113	0·118
Average	0·066	0·066	0·078	0·070	0·066

*Mean Daily Movement.**

[Expressed in pence per lb. avoirdupois.]

	<i>d.</i>	<i>d.</i>	<i>d.</i>	<i>d.</i>	<i>d.</i>
1900-01	0·047	0·027	0·034	0·049	0·030
'01-02	0·033	0·018	0·017	0·033	0·027
'02-03	0·043	0·033	0·032	0·046	0·029
'03-04	0·103	0·067	0·087	0·105	0·094
Average	0·056	0·036	0·042	0·058	0·045

Range of Movement.

[Expressed as a percentage of the average of the highest and lowest prices.]

1900-01	52·4	40·0	40·0	52·4	45·7
'01-02	24·2	28·5	23·6	23·4	26·7
'02-03	50·0	56·6	47·7	47·2	50·4
'03-04	46·6	57·2	58·0	44·8	45·9
Average	43·3	45·4	42·3	41·9	42·2

Average Monthly Extreme Movement.

[Expressed in pence per lb. avoirdupois.]

	<i>d.</i>	<i>d.</i>	<i>d.</i>	<i>d.</i>	<i>d.</i>
1900-01	0·54	0·40	0·47	0·45	0·50
'01-02	0·29	0·25	0·20	0·28	0·32
'02-03	0·48	0·38	0·39	0·40	0·40
'03-04	1·00	0·88	0·97	0·98	1·08
Average	0·58	0·49	0·51	0·53	0·57

* The difference between the average movement and the mean daily movement is explained in a note on p. 326.

*Frequency of Movement.**

[Expressed as percentage of number of daily movements to number of daily quotations.]

Year.	Havre.	New Orleans.	New York.	Liverpool.	Bremen.
1900-01	80.1	50.7	49.9	76.8	60.7
'01-02	69.4	38.7	40.6	65.5	53.7
'02-03	91.7	35.2	45.2	80.8	60.9
'03-04	93.6	64.1	66.8	92.0	79.5
Average	83.7	47.2	50.6	79.8	63.7

* As to the suitability of this measurement, see p. 325.

According to *à priori* reasoning (the independence of each market being assumed), Liverpool and New York should have been at the one extreme and Bremen at the other, the average movement, the range of movement, and the average monthly extreme movement being highest, but the frequency of movement lowest, at the Bremen end of the scale. These *à priori* expectations are not borne out by such facts as are incorporated in the tables above, and probably for the reasons already advanced.

We now pass on to describe another method by which we attempted to elicit further information from the material available.

We decided to split up the hypothesis under test into two, which might be stated as follows:—

(1) "Futures" sold into a new crop year tend to smooth the prices as between the old and the new years.

(2) "Futures" steady the prices ruling in each crop year.

This division was made because the statements given refer to different sets of conditions which require separate analysis. Each crop year may be taken as running from September of one year to the August of the next year.

Hypothesis (1) will be examined first. All the information required is arranged in the table beneath: an account of the plans followed in constructing it, and the methods of interpreting it, succeed.

[Prices are given in pence and sixty-fourths.]

1	2	3	4	5	6	7	8	9	10	11	12
Year.	Monthly Average Differences between Quotations for June-July and October-November "Futures."	Three-Monthly Averages of Differences given in Column 2.	Average "Spot" Prices (December to June).	Differences between Average "Spot" Prices given in Column 4.	Average "Spot" Prices for May, June, and July.	Average "Spot" Prices for October and November.	Differences between Columns 6 and 7.	Crops in Thousand Bales.	Differences between Crops.	Average Price of October-November "Futures" in July.	Differences between Columns 11 and 4.
1880	May + 22 June + 24 July + 34	+ 27	d. 6.16 (1880-81)	....	d.	d. ....	....	6,606 (1880-81)	....	d. ....	....
'81	May + 8 June + 17 July + 36	+ 30	6.42 (1881-82)	- 26	6.11	6.32	- 21	5,456 (1881-82)	- 1,150	6.1	+ 15
'82	May + 11 June + 15 July + 18	+ 15	5.42	+ 64	6.51	6.22	+ 29	6,950	+ 1,494	6.42	0
'83	May + 6 June + 1 July + 1	+ 2	6.2	- 24	5.42	5.56	- 14	5,713	- 1,237	6.30	- 52
'84	May + 5 June + 9 July + 11	+ 8	5.58	+ 8	6.19	5.86	+ 47	5,706	- 7	6.4	- 2
'85	May + 5 June + 2 July + 4	+ 4	5.2	+ 56	5.48	5.20	+ 28	6,575	+ 869	5.33	+ 25
'86	May + 5 June + 8 July + 16	+ 6	5.28	- 26	5.13	5.16	- 3	6,499	- 76	5.7	- 5
'87	May + 24 June + 24 July + 24	+ 21	5.30	- 2	5.50	5.23	+ 27	7,047	+ 548	5.17	+ 11

1 Year.	2 Monthly Average Differences between Quotations for June-July and October-November "Futures."	3 Three- Monthly Averages of Differences given in Column 2.	4 Average "Spot" Prices (December to June).	5 Differences between Average "Spot" Prices given in Column 4.	6 Average "Spot" Prices for May, June, and July.	7 Average "Spot" Prices for October and November.	8 Differences between Columns 6 and 7.	9 Crops in Thousand Bales.	10 Differences between Crops.	11 Average Price of October- November "Futures" in July.	12 Differences between Columns 11 and 4.
1888	May + 15 June + 16 July + 20	+ 17	d. 5'46 (1888-89)	- 16	d. 5'30	d. 5'50	- 20	6,989 (1888-89)	- 108	d. 5'13	+ 17
'89	May - 27 June - 29 July - 30	- 29	6'8	- 26	6'9	5'55	+ 18	7,297	+ 358	5'36	+ 10
'90	May + 34 June + 30 July + 42	+ 37	4'58	+ 78	5'33	5'31	+ 2	8,674	+ 1,377	5'55	+ 17
'91	May - 9 June - 14 July - 9	- 11	3'62	+ 60	4'40	4'42	- 2	9,018	+ 344	4'34	+ 24
'92	May - 9 June - 10 July - 6	- 8	4'54	- 56	4'2	4'40	- 38	6,664	- 2,354	3'61	+ 1
'93	May - 6 June - 5 July - 3	- 5	4'10	+ 44	4'12	4'36	- 24	7,532	+ 868	4'27	+ 27
'94	May - 5 June - 3 July - 3	- 4	3'22	+ 52	4'11	3'14	+ 61	9,893	+ 2,361	3'57	+ 17
'95	May - 4 June - 3 July - 4	- 4	4'21	- 63	3'47	4'33	- 50	7,162	- 2,731	3'46	- 24

1	2	3	4	5	6	7	8	9	10	11	12
Year.	Monthly Average Differences between Quotations for June-July and October-November "Futures."	Three-Monthly Averages of Differences given in Column 2.	Average "Spot" Prices (December to June).	Differences between Average "Spot" Prices given in Column 4.	Average "Spot" Prices for May, June, and July.	Average "Spot" Prices for October and November.	Differences between Columns 6 and 7.	Crops in Thousand Bales.	Differences between Crops.	Average Price of October-November "Futures" in July.	Differences between Columns 11 and 4.
1896	May + 18 June + 12 July + 11	+ 15	d. 4'1 (1896-97)	+ 20	d. 4'4	d. 4'33	- 29	8,714 (1896-97)	+ 1,552	d. 3'31	+ 54
'97	May + 18 June + 16 July + 17	+ 17	3'25	+ 40	4'10	3'32	+ 42	11,181	+ 2,467	3'57	+ 8
'98	May + 1 June + 2 July + 3	+ 2	3'21	+ 4	3'32	3'3	+ 29	11,235	+ 54	3'20	+ 5
'99	May + 1 June + 1 July + 3	+ 2	5'10	- 117	3'22	4'4	- 46	9,440	- 1,795	3'15	+ 6
1900	May + 41 June + 37 July + 60	+ 46	4'59	+ 15	5'26	5'25	+ 1	10,425	+ 985	4'46	+ 28
'01	May + 18 June + 25 July + 17	+ 20	4'53	+ 6	4'33	4'36	- 3	10,701	+ 276	4'14	+ 45
'02	May + 30 June + 28 July + 29	+ 29	5'34	- 45	5'3	4'43	+ 24	10,758	+ 57	4'23	+ 30

Column 3 of the table above represents an attempt to measure anticipations as to future prices, and eliminate the peculiarities of the dealings on particular days, by contrasting the prices of June-July "futures" with the prices of October-November "futures" towards the close of the old crop year. June-July "futures" were taken instead of July-August because the latter are sometimes affected by the new crop, and October-November "futures" were selected to represent ideas of prices in the coming crop year, because the September-October "futures" might occasionally be affected by fears as to retardation of the crop or the temporary hugging of supplies. The market would have time to settle down before the seller of "October-Novembers" would be compelled to deliver. Were cheaper cotton expected after the harvest, prices for delivery after the harvest should be lower than prices for earlier deliveries; and were dearer cotton expected, existing stocks would be held against it and the prices for the future would include costs of holding it which would vary as the time for which it was held. Appreciable differences between the crops also ought to vary commonly with the gaps between near and distant "futures" already noted, since usually demand over the period involved may be taken as comparatively constant. The gaps above mentioned have been written as plus quantities when the near "futures" are dearer than the distant "futures," and as minus quantities when the relation between these prices is reversed. In order to show clearly the correlation between these gaps and the groups of figures with which they are compared, signs have been attached to the latter on such a principle that a plus sign shall indicate a variation with which a wide plus gap should correspond were the gaps to indicate merely anticipation of coming prices in relation to prices judged to be reasonable prior to the new cotton coming into sight. The average prices of "spot" cotton for the year given in column 4 have been calculated from December to the end of June to avoid the abnormal prices which are reached sometimes at the beginning and end of the crop years.

First we correlated columns 3 and 5 without much expectation, however, of a close relation being exhibited owing to the relative remoteness of the average "spot" price of the year of the quotation of the "futures" from the prices ruling during the quotations, and the frequent divergencies of "spot" prices in October and November from the average.¹² We arrived at a co-efficient of correlation

¹² The method employed will be found discussed in Section VI of Part II of Bowley's "Elements of Statistics." In each series take the differences between the average and the individual quotations. Call these differences $x_1, x_2, \dots, x_n$ and $y_1, y_2, \dots, y_n$ respectively. Then " r " (the co-efficient of cor-

of +.165 and a probable error of .138. We then correlated columns 3 and 8; the outcome was a positive co-efficient of correlation of .06, which was less than its probable error (.142). Next we correlated columns 12 and 5 and reached a co-efficient of correlation of +.365 and a probable error of .124. The selection of these three correlations will explain itself, and it seems unnecessary here, after the general discussion at the beginning of this paper and discussions that will follow, to enter into subtleties as to the suitability and defects of each of them. We cannot claim that these results assist to establish the belief that relative anticipations with reference to prices of the new crop tend to be more frequently right than wrong. Support for such a belief, however, is probably to be obtained from a simple inspection of the curves drawn in Diagram I, for these curves show, as a rule, such moderately smooth and gradual movements from the price level of one year to that of another as could only have been brought about by the effective working of comparatively far-reaching anticipation in the right direction.

We now reach a part of our investigation to which we have devoted the most time. It relates to the testing of the second hypothesis (that is, the hypothesis relating to the effect of "futures" in the same crop year) by a method suggested by us in the *Economic Journal* for December, 1904. Unfortunately the results reached do not encourage us to hope much from this method. In the article in the *Economic Journal* we drew attention to the variable gaps between the "futures" for different months, and suggested that the variations were partially explained by the operation of "futures."¹³ We suggested further that the

relation) = $\frac{\sum (xy)}{n \sigma_1 \sigma_2}$, where "n" is the number of quotations in each series, and σ_1 and σ_2 indicate the standard deviations of each series. We have taken σ as $\frac{5}{4}$ of the mean deviation. The probable error of $r = .67 \frac{1-r^2}{\sqrt{n}}$. Theoretically, if correlation is perfect, $r = 1$, while, if there is no correlation, $r = 0$. If positive correlation means that an upwards movement in one series tends to be followed by a similar upward movement in the other series, then negative correlation means that the ascents of one curve tend to be accompanied by descents of the other. It may assist some readers if we add that the co-efficient of correlation is used in order that the quantities as well as the directions of the movements in each series may be taken into account and duly balanced against each other. There is little evidence for correlation unless "r" is considerably greater than its probable error.

¹³ See p. 550 *et seq.*, *Economic Journal*, December, 1904. For convenience we reproduce below two specially relevant passages, but for the whole argument the reader must be referred to the article in question.

"These different relations between the prices of the various sets of 'futures' are (probably) to be accounted for (partially) as follows:—

"(a.) Other things being equal, the longer a 'future' has to run the greater

effect of "futures" upon prices might be explained by examining over a longer period these gaps, which we believe to be in some cases and in some degree the vestiges left by the "bulling" or "bearing" play of "futures" on spot, whether deliberately induced or not. We show in Diagram III, by way of example, some of these gaps. Each horizontal division in the diagram stands for "futures" of different remoteness, and each vertical division stands for one-fiftieth of a penny. The numbered lines give the price of "spot" on the day of quotation. The barred line indicates the last of the "futures" in the old crop year. Thus, to interpret the second example in the diagram, the quotations of cotton per pound in pence and sixty-fourths were on 18th November, 1895:—

	Spot	4'34
Current "futures"		4'28
November-December "futures"		4'27
December-January ,,		4'27
January-February ,,		4'27
February-March ,,		4'28
March-April ,,		4'28½
April-May ,,		4'29½
May-June ,,		4'31
June-July ,,		4'32
July-August ,,		4'33

The descents in price shown in the diagram being marked (+) and the ascents (−), the view put forward by us in the *Economic Journal* for December, 1904, was that, as a rule, "futures" were

"is the probability of cotton being purchasable at a low price against it (or of " 'futures' being purchasable back at a low price, which comes to the same " thing).

"(b.) Holding cotton against 'futures' is an expensive operation, and the " more expensive the longer the cotton has to be held. To cost of transport " and cost of storage must be added interest, and the discount rate is a variable.

"(c.) There may be general expectations of the market rising or falling.

" Obviously, if the market is expected to fall steadily on the whole, the " prices of 'futures' will be less the further their currency lies from the " present (other things being equal). And it is equally obvious that if the " market is expected to rise, the more distant the 'futures' the higher will be " their price. The price cannot rise above the price of 'spot,' plus the cost of " holding cotton; but this cost will be the greater the longer the cotton must " be held. There are circumstances under which the chances of the market are " in favour of the seller the longer the time given him to prepare to meet " his contract, within limits; but when these limits are passed the chances of " expensive holdings of cotton being involved increasingly surpass the chances " of gain.

" The 'spot' market appears to be driven into one position by present " demands in relation to Liverpool supplies and the cotton on the way, and by " other forces which are more far-reaching perhaps, but still forces in which

DIAGRAM III.

The figures stand for pence and sixty-fourths of a penny. The curve to the right of a barred line represents quotations falling within a new crop year.

tending to depress prices, or ceasing to force prices up, when the gaps were increasing in number and magnitude, while the effect of "futures" was the opposite under the reverse circumstances. In the case of prices being depressed by the working of "futures," we supposed the market price to have been judged generally by operators to be higher than a conceived norm¹⁴ for the season yet to run, or that the market was being deliberately beared for some ulterior object, and in the opposite case the contrary. In the paper already alluded to reasons were given for taking this view. We have now compared the changes in these gaps with the differences between "spot" prices and "the norm" of the year or of the time of the quotations.

We began by taking into account the width of the gaps between the various "futures," near and distant, as well as the directions of the quotations, and correlating these with "spot" prices, although we feared that the influence of "bulling" and "bearing" on these gaps might be obscured by the outcome of other influences. We omitted the quotations for about the first two months of the crop year, because we wanted the average of the "spot" quotations to approximate to our imagined norm of the year, and it would not have done so had "spot" prices for the first few weeks been included, since in those weeks prices are, as a rule, only climbing up or creeping down to the level of the new year as the new cotton comes into sight. Further, we could not carry our examination beyond the end of April since after April the number of quotations referring to the same crop becomes too small for a conclusion to be based upon them. The last quotation that we have taken in each crop year is July-August, because the August-September futures are affected largely by prospects of the new crop. Hence at the end of April the quotations to be considered are four, namely, April-May,

"reasoned imagination has not played a large part. In the light of imagination 'founded upon the present 'feel' of demand, the facts of the moment, 'estimates of the crop, and the relations between sales, and prices in previous years, the 'spot' market is criticised and judged to be 'high' or 'low' in relation to the conceived norm. Thus, by the play of judgment upon judgment (together with 'bulling' and 'bearing' operations by the aid of 'futures') the differences between the prices of the various sets of 'futures' and 'spot' are determined, and also the directions in which they shall lie. In a degree 'spot' prices and 'future' prices may be taken as independent variables." If for current "futures," "spot," and the next "future," and for other "futures," the two contiguous "futures" were perfect substitutes, "spot" and "future" prices would be completely dependent upon one another, but neither hypothesis is true to fact.

¹⁴ By the "norm" in this case, we mean the price at which the cotton should sell in view of the crop and stocks and demand existing and foreseen—but see p. 340.

May-June, June-July, and July-August. The first four "futures" only could, therefore, be considered throughout the year. We have correlated in consequence "spot" prices, and the differences between the first "future" (after the current "future") and the fourth "future," from about the beginning of November to the end of April. The results are as follows :—

Year.	Co-efficient of Correlation.	Probable Error of Co-efficient of Correlation.	Year.	Co-efficient of Correlation.	Probable Error of Co-efficient of Correlation.
1903-04 ...	— 0·5	0·1005	1898-99...	— 0·4	0·115
'02-03 ...	— 0·65	0·077	'97-98...	— 0·46	0·106
'01-02 ...	— 0·62	0·082	'96-97...	+ 0·92	0·02
'00-01 ...	+ 0·71	0·066	'95-96...	— 0·47	0·105
1899-1900	+ 0·57	0·09			

Had the correlations come out all positive or all negative, some of them being high, we should have been justified in deciding (a) that the gaps between the "futures" do indicate appreciably the "bulling" or "bearing" of the market, and (b) that speculation tends on the whole to smooth or disturb prices according as the correlations happened to be positive or negative. But some of the correlations being positive and others negative, we have no ground for inferring from the above results that (a) is true. Proposition (a) would have some support if the co-efficients above were closely correlated with the standard deviations of prices of the same years, negative co-efficients corresponding with high standard deviations; but a calculation showed that the degree of correlation was slight. Therefore (a), not being satisfactorily proved, we are unable to proceed to the conclusion that speculation steadies prices in some years and unsteadies them in other years. Our results are certainly peculiar in that some of the co-efficients of correlation are so high relatively to their probable errors though of variable sign. Probably, the effects of other causes influencing the gaps between the "futures" have, in some cases at least, obscured the effects of long-sighted speculation.

In the second line of investigation we decided :—

(1) To deal only with the directions of the "futures" from current "futures" onwards, writing falls (+) and rises (—) as before, and thereby to eliminate the effect of the disturbing causes bearing upon the magnitude of the gaps between the several "futures."

(2) To use all the "future" quotations falling within the same crop year. This meant that more of the gaps between the "futures" would have to be taken into account in some months than in others. In September, for instance, there are nine or ten quotations falling

in the same crop year, but in May there are four at most before the August-September quotation which is affected by anticipations of the new crop. Hence it became desirable to group our results by months as well as by years.

Obviously essential requisites for following up this line of investigation were (a) a numerical estimate of the norm, by reference to which the market is judged as "high" or low; and (b) an idea of the position of "futures" when they were neither "bulling" nor "bearing." The norm with reference to prices would not be the same at all times in a crop year, apart from variations in the subjective factors determining it, since the price at which the remainder of the crop should go off, were there no disturbances in price after January, say, there having been, let us suppose, sales at very high prices from September to December, would differ greatly from the price at which the whole crop would have been sold and bought had one price ruled from September throughout the year. The norm influencing the speculator would approach closer to an average obtained from the prices yet to come than to the average of the whole year, and probably anticipation does not reach far ahead with very close accuracy. The idea of the right price level which guides certain dealers may be about the average of the next two or three months. In order to meet these points we have made three sets of calculations, using as the norm, firstly, the average price of the year (quotations at the beginning and end of the crop year being omitted in calculating it); secondly, the average price of the three months after the month of the quotation being considered; and thirdly, the average price of the next month after the month of the quotation. After examining all the figures indicating the gaps between the futures, we selected certain ones as representing the inactivity of "futures" in their influence on "spot;" it will be sufficient to describe the selections made in a note.¹⁵ Finally, we compared the signs of departures of

¹⁵ It appeared from an inspection of the gaps between "futures" for the last twenty-two years (weekly quotations) that the position of the "futures" corresponding to their inactivity must have moved. Up to about 1895 the preponderance of minus quantities was enormous, but after 1895 the plus quantities exceeded the minus quantities. This change might have been due to a fall in the cost of holding and storing cotton; a gradual fall in the price of "futures" with the distance of their currency from the date of quotation would be changed into a gradual rise by a small addition to the cost of holding and storing cotton. However, we have made no special investigation into the causes of this change (apart from examining movements in the bank-rate which yielded no results), since we are concerned merely with the possibility of a particular interpretation being placed as a rule upon the general relative movements of the figures in question and not with the influences, other than pure market

spot prices from the norms with those of the differences between the figures giving the directions of "futures" and their norms as above described.

It will be desirable to give an example. The two columns below explain themselves; they relate to weekly quotations in January from 1896 to 1903:—

	1	2		1	2
	Differences between "Spot" and Average in Sixty-fourths.	Sum of Directions of "Futures."		Differences between "Spot" and Average in Sixty-fourths.	Sum of Directions of "Futures."
1896	+ 18	+ 2	1900	- 48½	+ 7
	+ 16	+ 4		- 42½	+ 7
	+ 12	+ 4		- 30½	+ 7
	+ 18	+ 5		- 12½	+ 7
1897	+ 1	- 4	1901	+ 45	+ 7
	+ 1	- 3		+ 37	+ 7
	+ 3	- 3		+ 39	+ 7
	- 1	- 2		+ 35	+ 7
1898	- 9	- 4	1902	- 23	+ 1
	- 11	- 4		- 21	0
	- 13	- 3		- 17	+ 1
	- 11	- 4		- 23	+ 1
1899	- 13	- 6	1903	- 54	- 1
	- 13	- 5		- 54	- 4
	- 5	- 5		- 46	- 2
	- 1	- 4		- 51	- 3

In column 2, 0 and + 1 were taken as the norms. 0 and + 1 were therefore written 0, all figures above 1 were written +, and all figures of minus quantity remained -. These signs were compared with the signs of column 1, and the agreements and

influences, affecting them. An examination of the future quotations as a whole seemed to show that the normal position (that is, according to our views, the position in which "futures" are neither "bulling" nor "bearing" the market) probably lay between 0 and + 1 in the years after 1895-96. We therefore wrote these numbers as zero, and took all positive and all negative figures as negative for the years after 1895-96. Similarly for the crop years prior to 1895-96, we have judged it suitable to make the following interpretations of the figures indicating the gaps between the prices of futures of different remoteness: the zeros to be - 3, - 4, and - 5 for the period September to December; - 3 and - 4 for January and February; - 3 for March; and - 2 for April; all numbers above these to be reckoned plus and all numbers below as minus. In order to avoid some of the errors that would arise from the averages taken as the norm not being suitable, we rejected differences between "spot" and the norms of less than nine 64ths. In order to guard against accidental results we tried the effects over short periods of increasing and decreasing our exclusions from both columns, and found that the general character of our results was not materially affected.

disagreements were noted. Similar operations were performed upon all the quotations dealt with. The results are stated below for the periods 1880-81 to 1884-85, 1885-86 to 1894-95, and 1895-96 to 1902-03.¹⁶

	1880-81 to 1884-85.		1885-86 to 1894-95.		1895-96 to 1902-03.	
	Agree-ments.	Disagree-ments.	Agree-ments.	Disagree-ments.	Agree-ments.	Disagree-ments.
Average of year = norm	51	15	77	76	91	68
Average of next three months = norm }	46	20	71	103	112	63
Average of next month = norm }	38	17	52	66	91	52
Average of three methods	45	17	67	82	98	61

The average of agreements and disagreements obtained from the three methods stands thus :—

Agreements..... 210 | Disagreements..... 160

The results with regard to the divergencies of spot from the average of the following three months are stated beneath by months as well as by years. Similar tables were prepared from the other two sets of calculations, but as little would be gained from printing them they are not reproduced here. In these tables + indicates agreements and - disagreements.

¹⁶ The figures for the first period were not obtained until the results for the other two had been calculated, and we then found that the figures were not given in the source from which we quoted prior to 1880. The carrying of the investigation back another five years did not seem important enough to lead us to search other sources.

	Septem-ber.		October.		Novem-ber.		Decem-ber.		January.		Feb-ruary.		March.		April.		Total.	
	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
1880-81 { +	5		4			1		1		4		4		4		2	9	
-																	16	
'81-82 { +	5		2		1						2		1		1		12	
-																	0	
'82-83 { +	5		2					1	1				2				10	
-																	1	
'83-84 { +							1				3		4		1		9	
-																	0	
'84-85 { +	4		1		1									1		2	6	
-																	3	
Total { +	19		9		2	1	1	2	1	4	5	4	7	5	2	4	46	
-																	20	
1885-86 { +	4					2		1					2		2		8	
-																	3	
'86-87 { +			1						1		3		1		2		8	
-																	0	
'87-88 { +		1								4		2		1	3		3	
-																	8	
'88-89 { +	4		4						2								10	
-									3		4		1		4		12	
'89-90 { +	4		3				4		2								13	
-													4		4		8	
'90-91 { +	3					2		3		4		1		3		2	3	
-																	15	
'91-92 { +		4		5		4		5		4			4		4		8	
-																	22	
'92-93 { +	4		3		3					4		3		4		2	10	
-								2									15	
'93-94 { +																	0	
-		2		2		4		1		3		3		1			16	
'94-95 { +									4				2		2		8	
-				4													4	
Total { +	19		11		3		4		9		3		9		13		71	
-		7		11		12		12		22		13		14		12	103	

	September.		October.		November.		December.		January.		February.		March.		April.		Total.	
	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
1895-96 { +	3								3		3		3		3		15	
-			3		1		2										6	
'96-97 { +	2										4		1				7	
-					2		1										4	
'97-98 { +									4		2		3				9	
-			4														4	
'98-99 { +					4		3		3								10	
-	2																2	
'99-1900 { +	1		1										4				6	
-			3		4		3		4		4						18	
1900-01 { +	4		2				3				4		3				16	
-			1		1				4								6	
'01-02 { +	2		4										4		1		11	
-					3		1										4	
'02-03 { +	5		4				2		4		4		5		2		26	
-					4												4	
'03-04 { +	2								1		2		4		3		12	
-	1		3		4		4		3		1						16	
Total { +	19		11		4		8		15		19		27		9		112	
-	3		14		19		11		11		5		0		0		63	

In no case is the proportion of agreements to disagreements great enough to enable the general preponderance of agreements to be asserted, especially in view of the fact that the disagreements exceeded the agreements in the middle period. Further there does not appear to be any correlation between the proportions of agreements to disagreements and standard deviations in the years for which we have obtained both. Our opinion is that the results of the examination described in the last part of this paper must not be taken to prove that abnormally low prices are as frequently "beared" through "futures" as "bulled," or *vice versa*. The explanation of the results probably is that, as we feared, influences other than those the effect of which we have sought to discover have played the leading part in determining the data from which our deductions have been drawn.

It will no doubt prove a convenience if we now briefly summarise the conclusions as a whole reached by the several methods examined.

I. *Deductive Method*.—There proved to be no thoroughfare owing

to our ignorance (a) of the proportion of dealing by experts and the inexpert, (b) of the liability of the public to the madness of the crowd, (c) of the degree in which dealings are used to influence prices instead of being determined by prices. The most serious disturbing circumstance which can have no beneficial results is the deal to influence prices—tampering with the market, as we have expressed it.

II. *Method of Concomitant Variations.*—The use of “futures” has increased, and it might, therefore, be argued that if prices have steadied the increasing use of “futures” is the cause. This does not follow, however, since other concomitant changes in economic conditions have taken place. An examination of prices over nearly forty years shows that if they became steadier on the whole up to late years they passed into a period of greater unsteadiness recently. The dealing syndicate is said to have become more common and to have increased in power, and it is alleged that the public is gambling more upon produce exchanges than it used to do. There is some probability, therefore, that the rising unsteadiness of prices may be explained, partially at least, by the operations of dealing syndicates and in some degree, perhaps, by the inexpert public’s use of “futures.”

III. *Method of Difference.*—This fails because the telegraph and telephone have so operated as practically to remove ostensible differences between markets in respect of the speculation taking place upon them.

IV. *Correlation of Observed Action of “Futures” with Different Price Levels.*—The result was another “no thoroughfare,” since the movements of “futures” in relation to each other probably reflect incidents other than their “bulling” or “bearing” influences on “spot.”

Finally, the reader must be warned again that nothing in this paper can be taken to demonstrate that prices would be steadier if “futures” were not used, or that it would not be advantageous to employ “futures” to facilitate the shifting of risks even if they disturbed prices in some degree. But that everybody concerned would be benefited, if gambling by the inexpert public and all tampering with the market could be prevented, we feel no doubt.

The figures in the appendix are weekly “spot” quotations for Middling American Cotton.

1864.			d.	1865.			d.	1866.			d.
January	8th	....	$28\frac{1}{4}$	January	6th	....	$26\frac{3}{4}$	January	4th	....	21
"	15th	....	28	"	13th	....	$26\frac{1}{4}$	"	11th	....	20
"	22nd	....	$27\frac{3}{4}$	"	20th	....	$24\frac{3}{4}$	"	18th	....	20
"	29th	....	$27\frac{1}{2}$	"	27th	....	$24\frac{1}{4}$	"	25th	....	$19\frac{1}{2}$
February	5th	....	$27\frac{1}{2}$	February	3rd	....	23	February	1st	....	$18\frac{3}{4}$
"	12th	....	$27\frac{1}{2}$	"	10th	....	$22\frac{3}{4}$	"	8th	....	$19\frac{1}{2}$
"	19th	....	$27\frac{1}{2}$	"	17th	....	$21\frac{1}{2}$	"	15th	....	$19\frac{3}{8}$
"	26th	....	$27\frac{1}{4}$	"	24th	....	$19\frac{1}{2}$	"	22nd	....	$18\frac{5}{8}$
March	4th	....	$27\frac{1}{4}$	March	3rd	....	$18\frac{1}{2}$	March	1st	....	$19\frac{1}{4}$
"	11th	....	$26\frac{3}{4}$	"	10th	....	$16\frac{1}{2}$	"	8th	....	$19\frac{1}{4}$
"	18th	....	27	"	17th	....	17	"	15th	....	$19\frac{3}{8}$
"	24th	....	$26\frac{3}{4}$	"	24th	....	$16\frac{1}{2}$	"	22nd	....	20
April	1st	....	$26\frac{3}{8}$	"	31st	....	$15\frac{1}{4}$	"	28th	....	$19\frac{1}{4}$
"	8th	....	$26\frac{1}{2}$	April	7th	....	$14\frac{3}{4}$	April	5th	....	$18\frac{3}{8}$
"	15th	....	27	"	13th	....	$14\frac{1}{2}$	"	12th	....	16
"	22nd	....	$27\frac{1}{2}$	"	21st	....	$13\frac{1}{2}$	"	19th	....	$14\frac{3}{4}$
"	29th	....	$27\frac{3}{4}$	"	28th	....	$14\frac{3}{4}$	"	26th	....	$15\frac{3}{8}$
May	6th	....	28	May	5th	....	$14\frac{3}{4}$	May	3rd	....	$14\frac{1}{2}$
"	13th	....	$28\frac{1}{2}$	"	12th	....	$14\frac{1}{2}$	"	10th	....	$13\frac{1}{2}$
"	20th	....	$28\frac{1}{2}$	"	19th	....	$14\frac{1}{2}$	"	17th	....	$13\frac{1}{2}$
"	27th	....	$28\frac{1}{2}$	"	26th	....	$15\frac{1}{2}$	"	24th	....	$12\frac{1}{2}$
June	3rd	....	$28\frac{1}{2}$	June	2nd	....	$16\frac{3}{4}$	"	31st	....	14
"	10th	....	$28\frac{3}{4}$	"	9th	....	17	June	7th	....	$13\frac{1}{2}$
"	17th	....	$29\frac{1}{2}$	"	16th	....	18	"	14th	....	$14\frac{1}{2}$
"	24th	....	$29\frac{1}{2}$	"	23rd	....	20	"	21st	....	$13\frac{1}{4}$
July	1st	....	30	"	30th	....	$20\frac{1}{2}$	"	28th	....	14
"	8th	....	$30\frac{3}{4}$	July	7th	....	$19\frac{1}{2}$	July	5th	....	$14\frac{1}{2}$
"	15th	....	$31\frac{1}{2}$	"	14th	....	$19\frac{1}{4}$	"	12th	....	$14\frac{1}{2}$
"	22nd	....	$31\frac{3}{4}$	"	21st	....	20	"	19th	....	$14\frac{1}{4}$
"	29th	....	$31\frac{1}{2}$	"	28th	....	$19\frac{3}{4}$	"	26th	....	$14\frac{1}{2}$
August	5th	....	$31\frac{1}{2}$	August	4th	....	$19\frac{1}{4}$	August	2nd	....	$14\frac{1}{2}$
"	12th	....	$30\frac{3}{4}$	"	11th	....	$19\frac{1}{4}$	"	9th	....	$14\frac{1}{4}$
"	19th	....	$30\frac{3}{4}$	"	18th	....	$18\frac{3}{4}$	"	16th	....	$14\frac{1}{2}$
"	26th	....	30	"	25th	....	$18\frac{1}{2}$	"	23rd	....	$14\frac{1}{4}$
September	2nd	....	31	September	1st	....	$18\frac{3}{4}$	"	30th	....	14
"	9th	....	$29\frac{1}{2}$	"	8th	....	$18\frac{3}{4}$	September	6th	....	$13\frac{1}{2}$
"	16th	....	$28\frac{1}{2}$	"	15th	....	$18\frac{3}{4}$	"	13th	....	$13\frac{1}{2}$
"	23rd	....	$27\frac{3}{4}$	"	22nd	....	$19\frac{1}{4}$	"	20th	....	14
"	30th	....	27	"	29th	....	$21\frac{3}{4}$	"	27th	....	$14\frac{3}{8}$
October	7th	....	26	October	6th	....	$24\frac{1}{4}$	October	4th	....	15
"	14th	....	24	"	13th	....	$24\frac{3}{4}$	"	11th	....	$15\frac{1}{4}$
"	21st	....	23	"	20th	....	24	"	18th	....	$15\frac{3}{8}$
"	28th	....	22	"	27th	....	$22\frac{1}{4}$	"	25th	....	$15\frac{1}{4}$
November	4th	....	$23\frac{1}{2}$	November	3rd	....	$20\frac{3}{4}$	November	1st	....	$15\frac{1}{4}$
"	11th	....	$24\frac{3}{8}$	"	10th	....	21	"	8th	....	$15\frac{1}{2}$
"	18th	....	$25\frac{1}{4}$	"	16th	....	20	"	15th	....	$14\frac{1}{2}$
"	25th	....	$27\frac{1}{2}$	"	23rd	....	20	"	22nd	....	$14\frac{1}{2}$
December	2nd	....	$26\frac{3}{8}$	"	30th	....	21	"	29th	....	$14\frac{1}{2}$
"	9th	....	$26\frac{3}{4}$	December	7th	....	$21\frac{1}{2}$	December	6th	....	$14\frac{1}{2}$
"	16th	....	$26\frac{1}{2}$	"	14th	....	$21\frac{3}{4}$	"	13th	....	$14\frac{1}{4}$
"	23rd	....	27	"	21st	....	$21\frac{1}{2}$	"	20th	....	$14\frac{3}{4}$
"	30th	....	27	"	28th	....	$21\frac{1}{4}$	"	27th	....	$15\frac{1}{4}$

1867.	d.	1868.	d.	1869.	d.
January 3rd	$15\frac{5}{8}$	January 9th	$7\frac{1}{2}$	January 7th	11
" 10th	$15\frac{1}{4}$	" 16th	$7\frac{3}{4}$	" 14th	$11\frac{1}{2}$
" 17th	$15\frac{1}{8}$	" 23rd	8	" 21st	$11\frac{1}{2}$
" 24th	$15\frac{1}{8}$	" 30th	$8\frac{1}{2}$	" 28th	$11\frac{1}{2}$
" 31st	$15\frac{1}{8}$	February 6th	$8\frac{3}{10}$	February 4th	$12\frac{1}{4}$
February 7th	$14\frac{5}{8}$	" 13th	$8\frac{7}{8}$	" 11th	$12\frac{5}{10}$
" 14th	$14\frac{1}{4}$	" 20th	$10\frac{3}{8}$	" 18th	$11\frac{7}{8}$
" 21st	$14\frac{1}{4}$	" 27th	$9\frac{9}{10}$	" 25th	$11\frac{7}{8}$
" 28th	$13\frac{7}{8}$	March 5th	10	March 4th	$11\frac{7}{8}$
March 7th	$13\frac{3}{4}$	" 12th	$10\frac{3}{8}$	" 11th	12
" 14th	$13\frac{3}{4}$	" 19th	$10\frac{3}{8}$	" 18th	12
" 21st	$13\frac{3}{4}$	" 26th	$10\frac{3}{8}$	" 24th	$12\frac{1}{8}$
" 28th	$13\frac{1}{2}$	April 2nd	$11\frac{7}{8}$	April 1st	$12\frac{3}{8}$
April 4th	13	" 8th	$12\frac{3}{8}$	" 8th	$12\frac{3}{8}$
" 11th	$12\frac{1}{4}$	" 16th	$12\frac{3}{8}$	" 15th	$12\frac{1}{4}$
" 17th	$11\frac{7}{8}$	" 23rd	$12\frac{5}{8}$	" 22nd	12
" 25th	$10\frac{3}{4}$	" 30th	$12\frac{5}{8}$	" 29th	$11\frac{7}{8}$
May 2nd	$11\frac{3}{4}$	May 7th	$12\frac{5}{8}$	May 6th	$11\frac{3}{4}$
" 9th	$11\frac{1}{4}$	" 14th	$12\frac{1}{4}$	" 13th	$11\frac{1}{2}$
" 16th	$11\frac{3}{4}$	" 21st	$11\frac{7}{8}$	" 20th	$11\frac{3}{8}$
" 23rd	$11\frac{1}{4}$	" 28th	$11\frac{1}{2}$	" 27th	$11\frac{1}{4}$
" 30th	$11\frac{3}{8}$	June 4th	$11\frac{3}{4}$	June 3rd	$11\frac{1}{2}$
June 6th	$11\frac{5}{8}$	" 11th	$11\frac{3}{8}$	" 10th	$11\frac{3}{4}$
" 13th	$11\frac{5}{8}$	" 18th	$11\frac{1}{2}$	" 17th	$12\frac{1}{10}$
" 20th	$11\frac{5}{8}$	" 25th	$11\frac{1}{2}$	" 24th	$12\frac{1}{4}$
" 27th	$11\frac{1}{4}$	July 2nd	$11\frac{1}{2}$	July 1st	$12\frac{1}{2}$
July 4th	11	" 9th	$11\frac{5}{8}$	" 8th	$12\frac{3}{8}$
" 11th	$10\frac{1}{2}$	" 16th	$11\frac{3}{8}$	" 15th	$12\frac{5}{8}$
" 18th	$10\frac{1}{2}$	" 23rd	$10\frac{5}{8}$	" 22nd	$12\frac{1}{2}$
" 25th	$10\frac{1}{2}$	" 30th	$9\frac{7}{8}$	" 29th	$12\frac{3}{4}$
August 1st	$10\frac{5}{8}$	August 6th	$9\frac{7}{8}$	August 5th	$12\frac{7}{8}$
" 8th	$10\frac{5}{8}$	" 13th	$10\frac{1}{4}$	" 12th	13
" 15th	$11\frac{1}{8}$	" 20th	$10\frac{3}{4}$	" 19th	$13\frac{3}{4}$
" 22nd	11	" 27th	$11\frac{1}{4}$	" 26th	$13\frac{11}{16}$
" 29th	$10\frac{1}{2}$	September 3rd	$11\frac{1}{8}$	September 2nd	$13\frac{11}{16}$
September 5th	$10\frac{1}{4}$	" 10th	$10\frac{3}{4}$	" 9th	$13\frac{3}{8}$
" 12th	$9\frac{3}{4}$	" 17th	$10\frac{3}{8}$	" 16th	13
" 19th	$9\frac{5}{8}$	" 24th	$10\frac{1}{4}$	" 23rd	$12\frac{1}{4}$
" 26th	9	October 1st	$10\frac{1}{2}$	" 30th	$12\frac{1}{4}$
October 3rd	$8\frac{3}{4}$	" 8th	$10\frac{7}{8}$	October 7th	$12\frac{3}{8}$
" 10th	$8\frac{1}{2}$	" 15th	11	" 14th	$12\frac{5}{8}$
" 17th	$8\frac{5}{8}$	" 22nd	11	" 21st	12
" 24th	9	" 29th	$11\frac{1}{4}$	" 28th	12
" 31st	9	November 5th	$11\frac{3}{8}$	November 4th	$12\frac{3}{8}$
November 7th	9	" 12th	$11\frac{1}{4}$	" 11th	$11\frac{1}{2}$
" 14th	$8\frac{3}{4}$	" 19th	11	" 18th	$11\frac{5}{8}$
" 21st	$8\frac{1}{2}$	" 26th	$11\frac{1}{2}$	" 25th	$11\frac{1}{2}$
" 28th	$7\frac{7}{8}$	December 3rd	$11\frac{1}{2}$	December 2nd	$12\frac{3}{4}$
December 5th	$7\frac{7}{8}$	" 10th	11	" 9th	$11\frac{3}{4}$
" 12th	$7\frac{5}{8}$	" 17th	$10\frac{3}{4}$	" 16th	$11\frac{3}{4}$
" 19th	$7\frac{5}{8}$	" 23rd	$10\frac{3}{4}$	" 22nd	$11\frac{1}{4}$
" 24th	$7\frac{5}{8}$	" 30th	11	" 30th	$11\frac{1}{2}$
" 31st	$7\frac{3}{8}$				

1870.	d.	1871.	d.	1872.	d.
January 6th	$11\frac{1}{2}$	January 5th	$7\frac{1}{10}$	January 4th	$10\frac{3}{10}$
" 13th	$11\frac{3}{8}$	" 12th	$7\frac{1}{2}$	" 11th	$10\frac{7}{10}$
" 20th	$11\frac{5}{8}$	" 19th	$7\frac{7}{8}$	" 18th	$10\frac{1}{2}$
" 27th	$11\frac{3}{4}$	" 26th	$8\frac{1}{10}$	" 25th	$10\frac{11}{10}$
February 3rd	$11\frac{1}{2}$	February 2nd	$7\frac{3}{10}$	February 1st	$11\frac{3}{10}$
" 10th	$11\frac{1}{2}$	" 9th	$7\frac{5}{8}$	" 8th	$11\frac{3}{8}$
" 17th	$11\frac{3}{8}$	" 16th	$7\frac{1}{2}$	" 15th	$11\frac{3}{10}$
" 24th	$11\frac{5}{10}$	" 23rd	$7\frac{1}{10}$	" 22nd	$11\frac{5}{10}$
March 3rd	$11\frac{1}{8}$	March 2nd	$7\frac{7}{10}$	" 29th	$11\frac{1}{8}$
" 10th	11	" 9th	$7\frac{3}{10}$	March 7th	$11\frac{5}{10}$
" 17th	$11\frac{3}{8}$	" 16th	$7\frac{3}{8}$	" 14th	$10\frac{11}{10}$
" 24th	$11\frac{1}{8}$	" 23rd	$7\frac{1}{2}$	" 21st	$11\frac{1}{10}$
" 31st	$10\frac{7}{8}$	" 30th	$7\frac{9}{10}$	" 28th	$11\frac{1}{10}$
April 7th	$11\frac{1}{4}$	April 6th	$7\frac{1}{2}$	April 4th	$11\frac{1}{2}$
" 14th	$11\frac{1}{8}$	" 13th	$7\frac{1}{2}$	" 11th	$11\frac{3}{10}$
" 21st	$11\frac{1}{8}$	" 20th	$7\frac{1}{4}$	" 18th	$11\frac{3}{10}$
" 28th	11	" 27th	$7\frac{1}{4}$	" 25th	$11\frac{1}{8}$
May 5th	$10\frac{7}{8}$	May 4th	$7\frac{5}{10}$	May 2nd	$11\frac{1}{10}$
" 12th	$11\frac{1}{8}$	" 11th	$7\frac{3}{8}$	" 9th	$10\frac{7}{8}$
" 19th	$10\frac{1}{10}$	" 18th	$7\frac{1}{2}$	" 16th	$11\frac{1}{8}$
" 26th	$10\frac{11}{10}$	" 25th	$7\frac{1}{10}$	" 23rd	$11\frac{1}{4}$
June 2nd	$10\frac{11}{10}$	June 1st	$7\frac{7}{8}$	" 30th	$11\frac{7}{10}$
" 9th	$10\frac{5}{8}$	" 8th	$8\frac{1}{8}$	June 6th	$11\frac{1}{2}$
" 16th	$10\frac{3}{8}$	" 15th	$8\frac{5}{10}$	" 13th	$11\frac{7}{10}$
" 23rd	$10\frac{1}{8}$	" 22nd	$8\frac{1}{2}$	" 20th	$11\frac{5}{10}$
" 30th	$9\frac{7}{8}$	" 29th	$8\frac{9}{10}$	" 27th	$11\frac{5}{10}$
July 7th	$9\frac{3}{4}$	July 6th	9	July 4th	$11\frac{1}{10}$
" 14th	$9\frac{5}{8}$	" 13th	9	" 11th	$10\frac{7}{8}$
" 21st	$8\frac{3}{8}$	" 20th	9	" 18th	$10\frac{11}{10}$
" 28th	$7\frac{1}{2}$	" 27th	$9\frac{1}{10}$	" 25th	$9\frac{5}{8}$
August 4th	$7\frac{7}{8}$	August 3rd	$8\frac{5}{10}$	August 1st	$9\frac{5}{8}$
" 11th	$8\frac{7}{8}$	" 10th	$8\frac{7}{8}$	" 8th	10
" 18th	$8\frac{5}{8}$	" 17th	$8\frac{7}{8}$	" 15th	$9\frac{1}{10}$
" 25th	9	" 24th	$9\frac{1}{10}$	" 22nd	$9\frac{1}{10}$
September 1st	9	" 31st	$9\frac{5}{10}$	" 29th	10
" 8th	$9\frac{1}{4}$	September 7th	$9\frac{1}{2}$	September 5th	$10\frac{3}{10}$
" 15th	$9\frac{1}{2}$	" 14th	$9\frac{1}{2}$	" 12th	$9\frac{1}{10}$
" 22nd	$9\frac{1}{4}$	" 21st	$9\frac{7}{10}$	" 19th	$9\frac{5}{8}$
" 29th	$8\frac{3}{4}$	" 28th	$9\frac{7}{10}$	" 26th	$9\frac{1}{2}$
October 6th	$8\frac{3}{4}$	October 5th	$9\frac{7}{8}$	October 3rd	$9\frac{5}{8}$
" 13th	$8\frac{1}{2}$	" 12th	$9\frac{3}{4}$	" 10th	$9\frac{11}{10}$
" 20th	$8\frac{5}{8}$	" 19th	$9\frac{11}{10}$	" 17th	$9\frac{3}{4}$
" 27th	$8\frac{11}{10}$	" 26th	$9\frac{1}{2}$	" 24th	$9\frac{11}{10}$
November 3rd	$9\frac{1}{8}$	November 2nd	$9\frac{1}{2}$	" 31st	$10\frac{1}{8}$
" 10th	9	" 9th	$9\frac{3}{8}$	November 7th	$9\frac{7}{8}$
" 17th	$9\frac{3}{10}$	" 16th	$9\frac{1}{2}$	" 14th	$9\frac{5}{8}$
" 24th	$9\frac{1}{4}$	" 23rd	$9\frac{9}{10}$	" 21st	$9\frac{7}{8}$
December 1st	9	" 30th	$9\frac{5}{8}$	" 28th	$9\frac{11}{10}$
" 8th	$8\frac{9}{10}$	December 7th	$9\frac{3}{4}$	December 5th	10
" 15th	$8\frac{1}{4}$	" 14th	10	" 12th	$10\frac{1}{10}$
" 22nd	$8\frac{3}{8}$	" 21st	$9\frac{11}{10}$	" 19th	$10\frac{3}{10}$
" 29th	$8\frac{1}{2}$	" 28th	$9\frac{11}{10}$	" 30th	$10\frac{9}{10}$

1873.	d.	1874.	d.	1875.	d.
January 9th	$10\frac{3}{10}$	January 8th	$8\frac{1}{2}$	January 7th	$7\frac{5}{8}$
" 16th	$9\frac{1}{10}$	" 15th	$8\frac{1}{4}$	" 14th	$7\frac{1}{10}$
" 23rd	$9\frac{7}{8}$	" 22nd	$8\frac{1}{10}$	" 21st	$7\frac{3}{4}$
" 30th	10	" 29th	$7\frac{13}{10}$	" 28th	$7\frac{5}{8}$
February 6th	$9\frac{15}{10}$	February 5th	$7\frac{3}{4}$	February 4th	$7\frac{1}{10}$
" 13th	$9\frac{3}{4}$	" 12th	8	" 11th	$7\frac{1}{10}$
" 20th	$9\frac{3}{4}$	" 19th	8	" 18th	$7\frac{5}{8}$
" 27th	$9\frac{3}{4}$	" 26th	$7\frac{7}{8}$	" 25th	$7\frac{7}{8}$
March 6th	$9\frac{11}{10}$	March 5th	$7\frac{3}{10}$	March 4th	$7\frac{15}{10}$
" 13th	$9\frac{1}{2}$	" 12th	$7\frac{5}{10}$	" 11th	$7\frac{7}{8}$
" 20th	$9\frac{1}{10}$	" 19th	$8\frac{1}{8}$	" 18th	$7\frac{7}{8}$
" 27th	$9\frac{1}{4}$	" 26th	$8\frac{3}{10}$	" 25th	$7\frac{15}{10}$
April 3rd	$9\frac{5}{10}$	April 1st	$8\frac{1}{8}$	April 1st	$7\frac{15}{10}$
" 10th	$9\frac{1}{4}$	" 9th	$8\frac{1}{8}$	" 8th	8
" 17th	$9\frac{3}{10}$	" 16th	$8\frac{1}{4}$	" 15th	8
" 24th	$9\frac{1}{8}$	" 23rd	$8\frac{1}{4}$	" 22nd	$7\frac{15}{10}$
May 1st	$9\frac{1}{10}$	" 30th	$8\frac{3}{10}$	" 29th	$7\frac{15}{10}$
" 8th	$8\frac{7}{8}$	May 7th	$8\frac{5}{10}$	May 6th	$7\frac{7}{8}$
" 15th	$8\frac{7}{8}$	" 14th	$8\frac{5}{8}$	" 13th	$7\frac{7}{8}$
" 22nd	$8\frac{7}{8}$	" 21st	$8\frac{5}{8}$	" 20th	$7\frac{7}{8}$
" 29th	$8\frac{7}{8}$	" 28th	$8\frac{1}{2}$	" 27th	$7\frac{7}{8}$
June 5th	$8\frac{7}{8}$	June 4th	$8\frac{7}{10}$	June 3rd	$7\frac{7}{8}$
" 12th	$8\frac{15}{10}$	" 11th	$8\frac{5}{10}$	" 10th	$7\frac{1}{10}$
" 19th	$8\frac{1}{10}$	" 18th	$8\frac{1}{4}$	" 17th	$7\frac{1}{2}$
" 26th	$8\frac{7}{8}$	" 25th	$8\frac{1}{4}$	" 24th	$7\frac{7}{10}$
July 3rd	$8\frac{7}{8}$	July 2nd	$8\frac{1}{2}$	July 1st	$7\frac{1}{2}$
" 10th	$8\frac{3}{2}$	" 9th	$8\frac{1}{2}$	" 8th	$7\frac{1}{4}$
" 17th	$8\frac{3}{4}$	" 16th	$8\frac{6}{10}$	" 15th	$7\frac{1}{10}$
" 24th	$8\frac{3}{4}$	" 23rd	$8\frac{3}{10}$	" 22nd	$6\frac{15}{10}$
" 31st	$8\frac{5}{8}$	" 30th	$8\frac{1}{2}$	" 29th	$7\frac{1}{10}$
August 7th	$8\frac{7}{8}$	August 6th	$8\frac{1}{4}$	August 5th	$7\frac{1}{4}$
" 14th	$8\frac{7}{8}$	" 13th	$8\frac{5}{10}$	" 12th	$7\frac{1}{8}$
" 21st	$8\frac{13}{10}$	" 20th	$8\frac{1}{4}$	" 19th	$7\frac{1}{10}$
" 28th	$8\frac{7}{8}$	" 27th	$8\frac{1}{8}$	" 26th	$7\frac{3}{10}$
September 5th	$8\frac{7}{8}$	September 3rd	$8\frac{1}{10}$	September 2nd	$7\frac{1}{8}$
" 11th	9	" 10th	$7\frac{5}{10}$	" 9th	7
" 18th	9	" 17th	8	" 16th	$6\frac{15}{10}$
" 25th	$8\frac{7}{8}$	" 24th	$7\frac{15}{10}$	" 23rd	$6\frac{15}{10}$
October 2nd	$8\frac{15}{10}$	October 1st	$7\frac{15}{10}$	" 30th	$6\frac{3}{4}$
" 9th	9	" 8th	8	October 7th	$6\frac{7}{8}$
" 16th	$9\frac{1}{8}$	" 15th	8	" 14th	$7\frac{1}{8}$
" 23rd	$9\frac{1}{8}$	" 22nd	$7\frac{15}{10}$	" 21st	$7\frac{1}{10}$
" 30th	$8\frac{7}{8}$	" 29th	$7\frac{3}{4}$	" 28th	7
November 6th	$8\frac{1}{2}$	November 5th	$7\frac{1}{10}$	November 4th	$6\frac{15}{10}$
" 13th	$8\frac{1}{2}$	" 12th	$7\frac{1}{10}$	" 11th	$6\frac{1}{2}$
" 20th	$8\frac{1}{10}$	" 19th	$7\frac{3}{4}$	" 18th	$6\frac{7}{8}$
" 27th	$8\frac{1}{10}$	" 26th	$7\frac{3}{4}$	" 25th	$6\frac{7}{8}$
December 4th	$8\frac{1}{2}$	December 3rd	$7\frac{5}{8}$	December 2nd	$6\frac{5}{8}$
" 11th	$8\frac{1}{4}$	" 10th	$7\frac{7}{10}$	" 9th	$6\frac{15}{10}$
" 18th	$8\frac{5}{10}$	" 17th	$7\frac{5}{10}$	" 16th	7
" 25th	$8\frac{1}{8}$	" 24th	$7\frac{5}{10}$	" 23rd	$6\frac{15}{10}$
"	$8\frac{1}{8}$	" 31st	$7\frac{3}{8}$	" 30th	$6\frac{15}{10}$

1876.			1877.			1878.		
		d.			d.			d.
January	6th	6 $\frac{1}{10}$	January	4th	6 $\frac{1}{10}$	January	3rd	6 $\frac{3}{8}$
"	13th	6 $\frac{3}{4}$	"	11th	7	"	10th	6 $\frac{3}{8}$
"	20th	6 $\frac{5}{8}$	"	18th	6 $\frac{1}{10}$	"	17th	6 $\frac{3}{8}$
"	27th	6 $\frac{5}{8}$	"	25th	6 $\frac{1}{10}$	"	24th	6 $\frac{1}{2}$
February	3rd	6 $\frac{1}{2}$	February	1st	6 $\frac{1}{10}$	"	31st	6 $\frac{1}{2}$
"	10th	6 $\frac{7}{10}$	"	8th	6 $\frac{5}{8}$	February	7th	6 $\frac{1}{4}$
"	17th	6 $\frac{1}{10}$	"	15th	6 $\frac{3}{4}$	"	14th	6 $\frac{1}{8}$
"	24th	6 $\frac{3}{10}$	"	22nd	6 $\frac{9}{10}$	"	21st	6 $\frac{1}{8}$
March	2nd	6 $\frac{1}{10}$	March	1st	6 $\frac{5}{8}$	"	28th	5 $\frac{1}{10}$
"	9th	6 $\frac{1}{2}$	"	8th	6 $\frac{5}{8}$	March	7th	6 $\frac{5}{8}$
"	16th	6 $\frac{7}{10}$	"	15th	6 $\frac{3}{8}$	"	14th	6 $\frac{1}{10}$
"	23rd	6 $\frac{9}{10}$	"	22nd	6 $\frac{1}{4}$	"	21st	6
"	30th	6 $\frac{7}{10}$	"	29th	6 $\frac{1}{8}$	"	28th	5 $\frac{1}{2}$
April	6th	6 $\frac{7}{10}$	April	5th	6 $\frac{1}{2}$	April	4th	5 $\frac{7}{8}$
"	13th	6 $\frac{3}{8}$	"	12th	6 $\frac{1}{8}$	"	11th	6
"	20th	6 $\frac{3}{8}$	"	19th	6	"	17th	5 $\frac{1}{2}$
"	27th	6 $\frac{1}{2}$	"	26th	5 $\frac{1}{2}$	"	25th	5 $\frac{1}{2}$
May	4th	6 $\frac{3}{10}$	May	3rd	5 $\frac{7}{8}$	May	2nd	5 $\frac{7}{8}$
"	11th	6 $\frac{1}{8}$	"	10th	5 $\frac{7}{8}$	"	9th	5 $\frac{5}{8}$
"	18th	6 $\frac{1}{2}$	"	17th	5 $\frac{1}{10}$	"	16th	6
"	25th	6	"	24th	5 $\frac{1}{10}$	"	23rd	6 $\frac{1}{8}$
June	1st	6	"	31st	5 $\frac{7}{8}$	"	30th	6 $\frac{3}{8}$
"	8th	6	June	7th	6	June	6th	6 $\frac{1}{2}$
"	15th	6 $\frac{3}{10}$	"	14th	6 $\frac{1}{4}$	"	13th	6 $\frac{5}{10}$
"	22nd	6 $\frac{3}{10}$	"	21st	6 $\frac{3}{10}$	"	20th	6 $\frac{1}{2}$
"	29th	6 $\frac{1}{10}$	"	28th	6 $\frac{5}{10}$	"	27th	6 $\frac{3}{10}$
July	6th	5 $\frac{7}{8}$	July	5th	6 $\frac{1}{2}$	July	4th	6 $\frac{1}{4}$
"	13th	5 $\frac{7}{8}$	"	12th	6 $\frac{5}{10}$	"	11th	6 $\frac{3}{8}$
"	20th	5 $\frac{7}{8}$	"	19th	6 $\frac{3}{8}$	"	18th	6 $\frac{1}{2}$
"	27th	5 $\frac{1}{10}$	"	26th	6 $\frac{5}{10}$	"	25th	6 $\frac{1}{2}$
August	3rd	6 $\frac{1}{10}$	August	2nd	6 $\frac{1}{8}$	August	1st	6 $\frac{5}{8}$
"	10th	6 $\frac{3}{10}$	"	9th	6	"	8th	6 $\frac{5}{8}$
"	17th	6 $\frac{1}{10}$	"	16th	6 $\frac{1}{10}$	"	15th	6 $\frac{9}{10}$
"	24th	6 $\frac{1}{10}$	"	23rd	5 $\frac{1}{10}$	"	22nd	6 $\frac{1}{10}$
"	31st	6	"	30th	6	"	29th	6 $\frac{1}{10}$
September	7th	6 $\frac{1}{10}$	September	6th	5 $\frac{1}{2}$	September	5th	6 $\frac{9}{10}$
"	14th	6	"	13th	6 $\frac{1}{8}$	"	12th	6 $\frac{1}{2}$
"	21st	5 $\frac{1}{10}$	"	20th	6 $\frac{5}{10}$	"	19th	6 $\frac{1}{2}$
"	28th	5 $\frac{1}{10}$	"	27th	6 $\frac{3}{8}$	"	26th	6 $\frac{3}{8}$
October	5th	5 $\frac{7}{8}$	October	4th	6 $\frac{7}{10}$	October	3rd	6 $\frac{7}{10}$
"	12th	5 $\frac{1}{10}$	"	11th	6 $\frac{5}{8}$	"	10th	6 $\frac{5}{10}$
"	19th	5 $\frac{1}{10}$	"	18th	6 $\frac{1}{2}$	"	17th	6 $\frac{1}{2}$
"	26th	6	"	25th	6 $\frac{9}{10}$	"	24th	6 $\frac{1}{10}$
November	2nd	6 $\frac{3}{10}$	November	1st	6 $\frac{7}{10}$	"	31st	5 $\frac{1}{10}$
"	9th	6 $\frac{5}{8}$	"	8th	6 $\frac{5}{10}$	November	7th	5 $\frac{1}{10}$
"	16th	6 $\frac{1}{2}$	"	15th	6 $\frac{3}{8}$	"	14th	5 $\frac{5}{8}$
"	23rd	6 $\frac{7}{10}$	"	22nd	6 $\frac{7}{10}$	"	21st	5 $\frac{1}{2}$
"	30th	6 $\frac{9}{10}$	"	29th	6 $\frac{7}{10}$	"	28th	5 $\frac{3}{8}$
December	7th	6 $\frac{1}{2}$	December	6th	6 $\frac{1}{2}$	December	5th	5 $\frac{1}{2}$
"	14th	6 $\frac{5}{8}$	"	13th	6 $\frac{9}{10}$	"	12th	4 $\frac{1}{10}$
"	21st	6 $\frac{9}{10}$	"	20th	6 $\frac{7}{10}$	"	19th	5 $\frac{7}{10}$
"	28th	6 $\frac{5}{8}$	"	27th	6 $\frac{3}{8}$	"	26th	5 $\frac{3}{10}$

1879.			1880.			1881.		
January	2nd	 $5\frac{3}{8}$	January	8th	 $7\frac{1}{10}$	January	6th	 $6\frac{1}{10}$
"	9th	 $5\frac{5}{10}$	"	15th	 $7\frac{1}{8}$	"	13th	 $6\frac{5}{8}$
"	16th	 $5\frac{5}{10}$	"	22nd	 7	"	20th	 $6\frac{9}{10}$
"	23rd	 $5\frac{5}{10}$	"	29th	 $7\frac{1}{10}$	"	27th	 $6\frac{9}{10}$
"	30th	 $5\frac{5}{10}$	February	5th	 $7\frac{3}{10}$	February	3rd	 $6\frac{7}{10}$
February	6th	 $5\frac{5}{10}$	"	12th	 $7\frac{1}{2}$	"	10th	 $6\frac{7}{10}$
"	13th	 $5\frac{3}{8}$	"	19th	 $7\frac{3}{8}$	"	17th	 $6\frac{7}{10}$
"	20th	 $5\frac{5}{10}$	"	26th	 $7\frac{5}{10}$	"	24th	 $6\frac{3}{8}$
"	27th	 $5\frac{3}{8}$	March	4th	 $7\frac{3}{8}$	March	3rd	 $6\frac{3}{8}$
March	6th	 $5\frac{5}{10}$	"	11th	 $7\frac{3}{8}$	"	10th	 $6\frac{3}{10}$
"	13th	 $5\frac{3}{8}$	"	18th	 $7\frac{1}{4}$	"	17th	 $6\frac{3}{10}$
"	20th	 $5\frac{9}{10}$	"	24th	 $7\frac{3}{8}$	"	24th	 $6\frac{1}{8}$
"	27th	 $5\frac{1}{2}$	April	1st	 $7\frac{1}{2}$	"	31st	 6
April	3rd	 $5\frac{1}{10}$	"	8th	 $7\frac{5}{10}$	April	7th	 $6\frac{1}{10}$
"	9th	 $6\frac{1}{10}$	"	15th	 7	"	14th	 6
"	17th	 $6\frac{3}{8}$	"	22nd	 $6\frac{1}{10}$	"	21st	 $5\frac{1}{10}$
"	24th	 $6\frac{3}{8}$	"	29th	 $6\frac{7}{8}$	"	28th	 $5\frac{1}{10}$
May	1st	 $6\frac{1}{2}$	May	6th	 $6\frac{7}{8}$	May	5th	 $5\frac{7}{8}$
"	8th	 $6\frac{1}{4}$	"	13th	 $6\frac{1}{10}$	"	12th	 $5\frac{3}{4}$
"	15th	 $7\frac{1}{10}$	"	20th	 $6\frac{1}{10}$	"	19th	 $5\frac{5}{8}$
"	22nd	 $7\frac{3}{10}$	"	27th	 $6\frac{1}{10}$	"	26th	 $5\frac{1}{10}$
"	29th	 $6\frac{1}{10}$	June	3rd	 6	June	2nd	 $5\frac{1}{10}$
June	5th	 $7\frac{1}{10}$	"	10th	 $6\frac{1}{10}$	"	9th	 $6\frac{1}{10}$
"	12th	 7	"	17th	 $6\frac{1}{10}$	"	16th	 $6\frac{3}{10}$
"	19th	 $6\frac{1}{4}$	"	24th	 $6\frac{3}{4}$	"	23rd	 $6\frac{3}{10}$
"	26th	 $6\frac{7}{8}$	July	1st	 $6\frac{1}{2}$	"	30th	 $6\frac{1}{10}$
July	3rd	 $6\frac{1}{10}$	"	8th	 $6\frac{1}{10}$	July	6th	 $5\frac{5}{10}$
"	10th	 $6\frac{7}{8}$	"	15th	 $6\frac{7}{8}$	"	14th	 $6\frac{9}{10}$
"	17th	 $6\frac{1}{10}$	"	22nd	 $6\frac{1}{10}$	"	21st	 $6\frac{5}{8}$
"	24th	 $6\frac{9}{10}$	"	29th	 $6\frac{1}{10}$	"	28th	 $6\frac{3}{4}$
"	31st	 $6\frac{9}{10}$	August	5th	 $6\frac{1}{10}$	August	4th	 $6\frac{1}{10}$
August	7th	 $6\frac{1}{10}$	"	12th	 $6\frac{1}{10}$	"	11th	 $6\frac{3}{4}$
"	14th	 $6\frac{3}{8}$	"	19th	 $6\frac{1}{10}$	"	18th	 7
"	21st	 $6\frac{9}{10}$	"	26th	 $7\frac{3}{10}$	"	25th	 $6\frac{1}{10}$
"	28th	 $6\frac{1}{10}$	September	2nd	 7	September	1st	 $6\frac{1}{10}$
September	4th	 $6\frac{1}{10}$	"	9th	 $7\frac{1}{10}$	"	8th	 $7\frac{1}{4}$
"	11th	 $6\frac{1}{10}$	"	16th	 $7\frac{3}{10}$	"	15th	 $7\frac{3}{10}$
"	18th	 $6\frac{5}{8}$	"	23rd	 $7\frac{1}{10}$	"	22nd	 $7\frac{1}{4}$
"	25th	 $6\frac{1}{2}$	"	30th	 $6\frac{7}{8}$	"	29th	 $7\frac{7}{10}$
October	2nd	 $6\frac{5}{8}$	October	7th	 $6\frac{1}{10}$	October	6th	 $6\frac{7}{8}$
"	9th	 $6\frac{1}{10}$	"	14th	 $6\frac{3}{4}$	"	13th	 $6\frac{7}{10}$
"	16th	 $6\frac{1}{10}$	"	21st	 $6\frac{3}{4}$	"	20th	 $6\frac{5}{8}$
"	23rd	 $6\frac{7}{8}$	"	28th	 $6\frac{3}{4}$	"	27th	 $6\frac{7}{10}$
"	30th	 $7\frac{5}{10}$	November	4th	 $6\frac{9}{10}$	November	3rd	 $6\frac{3}{8}$
November	6th	 $6\frac{3}{4}$	"	11th	 $6\frac{7}{10}$	"	10th	 $6\frac{7}{10}$
"	13th	 $6\frac{1}{10}$	"	18th	 $6\frac{3}{8}$	"	17th	 $6\frac{9}{10}$
"	20th	 $6\frac{3}{4}$	"	25th	 $6\frac{1}{10}$	"	24th	 $6\frac{1}{2}$
"	27th	 $6\frac{7}{8}$	December	2nd	 $6\frac{1}{10}$	December	1st	 $6\frac{1}{10}$
December	4th	 $6\frac{1}{10}$	"	9th	 $6\frac{5}{8}$	"	8th	 $6\frac{9}{10}$
"	11th	 7	"	16th	 $6\frac{1}{10}$	"	15th	 $6\frac{9}{10}$
"	18th	 $6\frac{1}{10}$	"	23rd	 $6\frac{1}{10}$	"	22nd	 $6\frac{1}{10}$
"	25th	 $6\frac{1}{10}$	"	30th	 $6\frac{1}{10}$	"	29th	 $6\frac{5}{8}$

1882.			d.	1883.			d.	1884.			d.
January	5th	....	6 $\frac{9}{10}$	January	4th	....	5 $\frac{1}{10}$	January	3rd	....	5 $\frac{1}{10}$
"	12th	....	6 $\frac{11}{10}$	"	11th	....	5 $\frac{1}{10}$	"	10th	....	5 $\frac{1}{10}$
"	19th	....	6 $\frac{3}{2}$	"	18th	....	5 $\frac{7}{10}$	"	17th	....	5 $\frac{1}{10}$
"	26th	....	6 $\frac{5}{8}$	"	25th	...	5 $\frac{5}{8}$	"	24th	....	5 $\frac{7}{8}$
February	2nd	....	6 $\frac{5}{8}$	February	1st	....	5 $\frac{1}{10}$	"	31st	....	5 $\frac{1}{10}$
"	9th	....	6 $\frac{1}{2}$	"	8th	....	5 $\frac{1}{10}$	February	7th	....	5 $\frac{7}{8}$
"	16th	....	6 $\frac{7}{10}$	"	15th	....	5 $\frac{5}{8}$	"	14th	....	5 $\frac{1}{10}$
"	23rd	....	6 $\frac{7}{10}$	"	22nd	....	5 $\frac{5}{8}$	"	21st	....	5 $\frac{1}{10}$
March	2nd	....	6 $\frac{1}{2}$	March	1st	....	5 $\frac{9}{10}$	"	28th	....	5 $\frac{7}{8}$
"	9th	....	6 $\frac{5}{8}$	"	8th	....	5 $\frac{9}{10}$	March	6th	....	5 $\frac{7}{8}$
"	16th	....	6 $\frac{11}{10}$	"	15th	....	5 $\frac{5}{8}$	"	13th	....	5 $\frac{7}{8}$
"	23rd	....	6 $\frac{11}{10}$	"	22nd	....	5 $\frac{5}{8}$	"	20th	....	5 $\frac{7}{8}$
"	30th	....	6 $\frac{5}{8}$	"	29th	....	5 $\frac{9}{10}$	"	27th	....	6
April	6th	....	6 $\frac{5}{8}$	April	5th	....	5 $\frac{9}{10}$	April	3rd	....	6 $\frac{1}{8}$
"	13th	....	6 $\frac{11}{10}$	"	12th	....	5 $\frac{5}{8}$	"	10th	....	6 $\frac{3}{10}$
"	20th	....	6 $\frac{11}{10}$	"	19th	....	5 $\frac{5}{8}$	"	16th	....	6 $\frac{1}{4}$
"	27th	....	6 $\frac{11}{10}$	"	26th	....	5 $\frac{5}{8}$	"	24th	....	6 $\frac{3}{10}$
May	4th	....	6 $\frac{5}{8}$	May	3rd	....	5 $\frac{3}{4}$	May	1st	....	6 $\frac{5}{8}$
"	11th	....	6 $\frac{5}{8}$	"	10th	....	5 $\frac{1}{10}$	"	8th	....	6
"	18th	....	6 $\frac{5}{8}$	"	17th	....	5 $\frac{1}{10}$	"	15th	....	6 $\frac{1}{4}$
"	25th	....	6 $\frac{5}{8}$	"	24th	....	5 $\frac{7}{8}$	"	22nd	....	6 $\frac{5}{10}$
June	1st	....	6 $\frac{5}{8}$	"	31st	....	5 $\frac{3}{4}$	"	29th	....	6 $\frac{1}{2}$
"	8th	....	6 $\frac{3}{4}$	June	7th	....	5 $\frac{3}{4}$	June	5th	....	6 $\frac{3}{8}$
"	15th	....	6 $\frac{3}{4}$	"	14th	....	5 $\frac{1}{10}$	"	12th	....	6 $\frac{7}{10}$
"	22nd	....	6 $\frac{7}{8}$	"	21st	....	5 $\frac{1}{10}$	"	19th	....	6 $\frac{3}{8}$
"	29th	....	6 $\frac{7}{8}$	"	28th	....	5 $\frac{1}{10}$	"	26th	....	6 $\frac{5}{10}$
July	6th	....	6 $\frac{7}{8}$	July	5th	....	5 $\frac{9}{10}$	July	3rd	....	6 $\frac{5}{10}$
"	13th	....	6 $\frac{1}{10}$	"	12th	....	5 $\frac{1}{2}$	"	10th	....	6 $\frac{3}{10}$
"	20th	....	6 $\frac{1}{10}$	"	19th	....	5 $\frac{7}{10}$	"	17th	....	6 $\frac{1}{4}$
"	27th	....	7 $\frac{1}{10}$	"	26th	....	5 $\frac{7}{10}$	"	24th	....	6 $\frac{1}{2}$
August	3rd	....	7	August	2nd	....	5 $\frac{5}{8}$	"	31st	....	6 $\frac{1}{4}$
"	10th	....	7 $\frac{1}{10}$	"	9th	....	5 $\frac{1}{10}$	August	7th	....	6 $\frac{3}{10}$
"	17th	....	7 $\frac{3}{10}$	"	16th	....	5 $\frac{1}{10}$	"	14th	....	3 $\frac{3}{10}$
"	24th	....	7 $\frac{1}{8}$	"	23rd	....	5 $\frac{5}{8}$	"	21st	....	6 $\frac{1}{10}$
"	31st	....	7 $\frac{5}{8}$	"	30th	....	5 $\frac{5}{8}$	"	28th	....	6 $\frac{1}{10}$
September	7th	....	7 $\frac{1}{8}$	September	6th	....	5 $\frac{1}{10}$	September	4th	....	6 $\frac{3}{10}$
"	14th	....	7	"	13th	....	5 $\frac{1}{10}$	"	11th	....	6 $\frac{1}{8}$
"	21st	....	7 $\frac{1}{10}$	"	20th	....	5 $\frac{1}{10}$	"	18th	....	6
"	28th	....	7	"	27th	....	5 $\frac{3}{4}$	"	25th	....	5 $\frac{1}{10}$
October	5th	....	6 $\frac{7}{8}$	October	4th	....	5 $\frac{7}{8}$	October	2nd	....	5 $\frac{3}{8}$
"	12th	....	6 $\frac{5}{8}$	"	11th	....	6 $\frac{1}{4}$	"	9th	....	5 $\frac{1}{10}$
"	19th	....	6 $\frac{3}{4}$	"	18th	....	5 $\frac{1}{10}$	"	16th	....	5 $\frac{5}{8}$
"	26th	....	6 $\frac{9}{10}$	"	25th	....	6	"	23rd	....	5 $\frac{7}{10}$
November	2nd	....	6 $\frac{3}{8}$	November	1st	....	6	"	30th	....	5 $\frac{7}{10}$
"	9th	....	6 $\frac{3}{10}$	"	8th	....	5 $\frac{1}{10}$	November	6th	....	5 $\frac{7}{10}$
"	16th	....	6 $\frac{1}{8}$	"	15th	....	5 $\frac{5}{8}$	"	13th	....	5 $\frac{1}{10}$
"	23rd	....	6 $\frac{1}{8}$	"	22nd	....	5 $\frac{1}{10}$	"	20th	....	5 $\frac{3}{4}$
"	30th	....	6 $\frac{5}{8}$	"	29th	....	6	"	27th	....	5 $\frac{1}{10}$
December	7th	....	6	December	6th	....	5 $\frac{7}{8}$	December	4th	....	5 $\frac{1}{10}$
"	14th	....	5 $\frac{1}{10}$	"	13th	....	5 $\frac{1}{10}$	"	11th	....	5 $\frac{7}{8}$
"	21st	....	5 $\frac{1}{10}$	"	20th	....	5 $\frac{3}{4}$	"	18th	....	5 $\frac{1}{10}$
"	28th	....	5 $\frac{1}{10}$	"	27th	....	5 $\frac{1}{10}$	"	25th	....	6 $\frac{1}{8}$
"		....	5 $\frac{3}{4}$								

1885.			d.	1886.			d.	1887.			d.
January	1st	....	6	January	7th	....	5	January	6th	....	$5\frac{5}{16}$
"	8th	....	$5\frac{1}{10}$	"	14th	....	$5\frac{1}{10}$	"	13th	....	$5\frac{1}{2}$
"	15th	....	$5\frac{1}{8}$	"	21st	....	$5\frac{1}{10}$	"	20th	....	$5\frac{3}{10}$
"	22nd	....	$5\frac{1}{2}$	"	28th	....	5	"	27th	....	$5\frac{3}{10}$
"	29th	....	6	February	4th	....	$4\frac{1}{10}$	February	3rd	....	$5\frac{1}{2}$
February	5th	....	$5\frac{1}{10}$	"	11th	....	$4\frac{1}{10}$	"	10th	....	$5\frac{1}{8}$
"	12th	....	6	"	18th	....	$4\frac{1}{2}$	"	17th	....	$5\frac{1}{8}$
"	19th	....	6	"	25th	....	$4\frac{1}{2}$	"	24th	....	$5\frac{1}{10}$
"	26th	....	$6\frac{1}{8}$	March	4th	....	$4\frac{1}{8}$	March	3rd	....	$5\frac{1}{2}$
March	5th	....	$6\frac{1}{10}$	"	11th	....	$4\frac{1}{8}$	"	10th	....	$5\frac{5}{10}$
"	12th	....	$5\frac{1}{10}$	"	18th	....	5	"	17th	....	$5\frac{3}{8}$
"	19th	....	$5\frac{1}{10}$	"	25th	....	$4\frac{1}{10}$	"	24th	....	$5\frac{1}{10}$
"	26th	....	6	April	1st	....	$4\frac{1}{10}$	"	31st	....	$5\frac{3}{8}$
April	2nd	....	6	"	8th	....	$5\frac{1}{10}$	April	7th	....	$5\frac{3}{8}$
"	9th	....	6	"	15th	....	$5\frac{1}{8}$	"	14th	....	$5\frac{1}{10}$
"	16th	....	$5\frac{1}{2}$	"	22nd	....	$5\frac{1}{10}$	"	21st	....	$5\frac{3}{8}$
"	23rd	....	$5\frac{1}{2}$	"	29th	....	$5\frac{1}{2}$	"	28th	....	$5\frac{3}{8}$
"	30th	....	$5\frac{1}{10}$	May	6th	....	$5\frac{3}{10}$	May	5th	....	$5\frac{1}{10}$
May	7th	....	$5\frac{1}{10}$	"	13th	....	$5\frac{1}{8}$	"	12th	....	$5\frac{1}{10}$
"	14th	....	$5\frac{1}{10}$	"	20th	....	$5\frac{1}{10}$	"	19th	....	$5\frac{1}{10}$
"	21st	....	$5\frac{1}{10}$	"	27th	....	$5\frac{1}{10}$	"	26th	....	$5\frac{1}{10}$
"	28th	....	$5\frac{1}{10}$	June	3rd	....	$5\frac{1}{8}$	June	2nd	....	6
June	4th	....	$5\frac{1}{10}$	"	10th	....	$5\frac{3}{8}$	"	9th	....	6
"	11th	....	$5\frac{1}{10}$	"	17th	....	$5\frac{1}{8}$	"	16th	....	6
"	18th	....	$5\frac{1}{10}$	"	24th	....	$5\frac{1}{8}$	"	23rd	....	$5\frac{1}{8}$
"	25th	....	$5\frac{1}{8}$	July	1st	....	$5\frac{1}{10}$	"	30th	....	$5\frac{1}{10}$
July	2nd	....	$5\frac{1}{10}$	"	8th	....	$5\frac{1}{10}$	July	7th	....	$5\frac{1}{2}$
"	9th	....	$5\frac{1}{10}$	"	15th	....	$5\frac{1}{10}$	"	14th	....	$5\frac{1}{2}$
"	16th	....	$5\frac{1}{2}$	"	22nd	....	$5\frac{1}{10}$	"	21st	....	$5\frac{1}{10}$
"	23rd	....	$5\frac{1}{2}$	"	29th	....	$5\frac{1}{10}$	"	28th	....	$5\frac{1}{10}$
"	30th	....	$5\frac{1}{2}$	August	5th	....	$5\frac{1}{4}$	August	4th	....	$5\frac{1}{2}$
August	6th	....	$5\frac{1}{2}$	"	12th	....	$5\frac{1}{10}$	"	11th	....	$5\frac{1}{2}$
"	13th	....	$5\frac{1}{10}$	"	19th	....	$5\frac{1}{10}$	"	18th	....	$5\frac{1}{10}$
"	20th	....	$5\frac{1}{10}$	"	26th	....	$5\frac{1}{8}$	"	25th	....	$5\frac{1}{8}$
"	27th	....	$5\frac{1}{2}$	September	2nd	....	$5\frac{1}{8}$	September	1st	....	$5\frac{1}{2}$
September	3rd	....	$5\frac{1}{10}$	"	9th	....	$5\frac{1}{10}$	"	8th	....	$5\frac{1}{10}$
"	10th	....	$5\frac{1}{10}$	"	16th	....	$5\frac{1}{4}$	"	15th	....	$5\frac{1}{2}$
"	17th	....	$5\frac{1}{10}$	"	23rd	....	$5\frac{1}{10}$	"	22nd	....	$5\frac{1}{10}$
"	24th	....	$5\frac{1}{10}$	"	30th	....	$5\frac{1}{10}$	"	29th	....	$5\frac{1}{4}$
October	1st	....	$5\frac{1}{2}$	October	7th	....	$5\frac{1}{2}$	October	6th	....	$5\frac{3}{10}$
"	8th	....	$5\frac{1}{2}$	"	14th	....	$5\frac{1}{8}$	"	13th	....	$5\frac{3}{10}$
"	15th	....	$5\frac{1}{2}$	"	21st	....	$5\frac{1}{10}$	"	20th	....	$5\frac{1}{4}$
"	22nd	....	$5\frac{1}{2}$	"	28th	....	$5\frac{1}{10}$	"	27th	....	$5\frac{1}{10}$
"	29th	....	$5\frac{1}{4}$	November	4th	....	$5\frac{1}{8}$	November	3rd	....	$5\frac{1}{10}$
November	5th	....	$5\frac{1}{10}$	"	11th	....	$5\frac{1}{2}$	"	10th	....	$5\frac{1}{2}$
"	12th	....	$5\frac{1}{8}$	"	18th	....	$5\frac{1}{10}$	"	17th	....	$5\frac{1}{8}$
"	19th	....	$5\frac{1}{10}$	"	25th	....	$5\frac{1}{10}$	"	24th	....	$5\frac{1}{2}$
"	26th	....	$5\frac{1}{2}$	December	2nd	....	$5\frac{1}{2}$	December	1st	....	$5\frac{1}{8}$
December	3rd	....	$5\frac{1}{10}$	"	9th	....	$5\frac{1}{4}$	"	8th	....	$5\frac{1}{10}$
"	10th	....	$5\frac{1}{10}$	"	16th	....	$5\frac{1}{4}$	"	15th	....	$5\frac{1}{8}$
"	17th	....	5	"	23rd	....	$5\frac{1}{2}$	"	22nd	....	$5\frac{1}{10}$
"	24th	....	5	"	30th	....	$5\frac{1}{4}$	"	29th	....	$5\frac{1}{4}$
"	31st	....	$4\frac{1}{10}$								

1898.			d.	1899.			d.	1890.			d.
January	5th	...	$5\frac{1}{16}$	January	3rd	...	$5\frac{3}{8}$	January	2nd	...	$5\frac{3}{8}$
"	12th	...	$5\frac{5}{8}$	"	10th	...	$5\frac{7}{16}$	"	9th	...	$5\frac{1}{8}$
"	19th	...	$5\frac{5}{8}$	"	17th	...	$5\frac{1}{2}$	"	16th	...	$6\frac{1}{16}$
"	26th	...	$5\frac{5}{8}$	"	24th	...	$5\frac{1}{2}$	"	23rd	...	$6\frac{1}{16}$
February	2nd	...	$5\frac{9}{16}$	"	31st	...	$5\frac{1}{2}$	"	30th	...	6
"	9th	...	$5\frac{1}{2}$	February	7th	...	$5\frac{5}{8}$	February	6th	...	$6\frac{1}{16}$
"	16th	...	$5\frac{9}{16}$	"	14th	...	$5\frac{9}{16}$	"	13th	...	$6\frac{1}{16}$
"	23rd	...	$5\frac{9}{16}$	"	21st	...	$5\frac{9}{16}$	"	20th	...	$6\frac{1}{16}$
March	1st	...	$5\frac{9}{16}$	"	28th	...	$5\frac{5}{8}$	"	27th	...	$6\frac{1}{16}$
"	8th	...	$5\frac{3}{8}$	March	7th	...	$5\frac{1}{16}$	March	6th	...	$6\frac{1}{8}$
"	15th	...	$5\frac{3}{8}$	"	14th	...	$5\frac{1}{16}$	"	13th	...	$6\frac{1}{16}$
"	22nd	...	$5\frac{5}{16}$	"	21st	...	$5\frac{1}{16}$	"	20th	...	$6\frac{1}{8}$
"	29th	...	$5\frac{5}{16}$	"	28th	...	$5\frac{1}{16}$	"	27th	...	$6\frac{1}{8}$
April	5th	...	$5\frac{5}{16}$	April	4th	...	$5\frac{3}{8}$	April	3rd	...	$6\frac{1}{8}$
"	12th	...	$5\frac{5}{16}$	"	11th	...	$5\frac{1}{16}$	"	10th	...	$6\frac{1}{8}$
"	19th	...	$5\frac{5}{16}$	"	18th	...	$5\frac{1}{16}$	"	17th	...	$6\frac{3}{8}$
"	26th	...	$5\frac{3}{8}$	"	25th	...	6	"	24th	...	$6\frac{7}{8}$
May	3rd	...	$5\frac{7}{16}$	May	2nd	...	$5\frac{1}{16}$	May	1st	...	$6\frac{7}{8}$
"	10th	...	$5\frac{7}{16}$	"	9th	...	$6\frac{1}{16}$	"	8th	...	$6\frac{1}{2}$
"	17th	...	$5\frac{3}{8}$	"	16th	...	$6\frac{1}{16}$	"	15th	...	$6\frac{9}{16}$
"	24th	...	$5\frac{3}{8}$	"	23rd	...	6	"	22nd	...	$6\frac{5}{8}$
"	31st	...	$5\frac{3}{8}$	"	30th	...	6	"	29th	...	$6\frac{9}{16}$
June	7th	...	$5\frac{3}{8}$	June	6th	...	$6\frac{1}{16}$	June	5th	...	$6\frac{1}{2}$
"	14th	...	$5\frac{7}{16}$	"	13th	...	$6\frac{1}{16}$	"	12th	...	$6\frac{7}{8}$
"	21st	...	$5\frac{1}{2}$	"	20th	...	$6\frac{1}{16}$	"	19th	...	$6\frac{3}{8}$
"	28th	...	$5\frac{1}{2}$	"	27th	...	$6\frac{1}{16}$	"	26th	...	$6\frac{7}{8}$
July	5th	...	$5\frac{9}{16}$	July	4th	...	$6\frac{1}{8}$	July	3rd	...	$6\frac{1}{2}$
"	12th	...	$5\frac{9}{16}$	"	11th	...	$6\frac{3}{16}$	"	10th	...	$6\frac{9}{16}$
"	19th	...	$5\frac{9}{16}$	"	18th	...	$6\frac{3}{16}$	"	17th	...	$6\frac{5}{8}$
"	26th	...	$5\frac{9}{16}$	"	25th	...	$6\frac{1}{8}$	"	24th	...	$6\frac{1}{16}$
August	2nd	...	$5\frac{9}{16}$	August	1st	...	$6\frac{1}{4}$	"	31st	...	$6\frac{1}{16}$
"	9th	...	$5\frac{1}{16}$	"	8th	...	$6\frac{1}{4}$	August	7th	...	$6\frac{1}{16}$
"	16th	...	$5\frac{5}{8}$	"	15th	...	$6\frac{3}{8}$	"	14th	...	$6\frac{1}{2}$
"	23rd	...	$5\frac{9}{16}$	"	22nd	...	$6\frac{1}{2}$	"	21st	...	$6\frac{1}{4}$
"	30th	...	$5\frac{1}{16}$	"	29th	...	$6\frac{5}{8}$	"	28th	...	$5\frac{7}{8}$
September	6th	...	$5\frac{1}{16}$	September	5th	...	$6\frac{1}{16}$	September	4th	...	$5\frac{1}{16}$
"	13th	...	6	"	12th	...	$6\frac{1}{16}$	"	11th	...	$5\frac{1}{16}$
"	20th	...	$5\frac{1}{16}$	"	19th	...	$6\frac{3}{4}$	"	18th	...	$5\frac{1}{16}$
"	27th	...	6	"	26th	...	$6\frac{1}{16}$	"	25th	...	$5\frac{3}{8}$
October	4th	...	$5\frac{1}{16}$	October	3rd	...	$6\frac{7}{16}$	October	2nd	...	$5\frac{3}{8}$
"	11th	...	$5\frac{1}{8}$	"	10th	...	$6\frac{5}{16}$	"	9th	...	$5\frac{3}{4}$
"	18th	...	$5\frac{1}{16}$	"	17th	...	$6\frac{1}{16}$	"	16th	...	$5\frac{1}{16}$
"	25th	...	$5\frac{7}{8}$	"	24th	...	$5\frac{1}{4}$	"	23rd	...	$5\frac{9}{16}$
November	1st	...	$5\frac{3}{4}$	"	31st	...	$5\frac{1}{16}$	"	30th	...	$5\frac{3}{8}$
"	8th	...	$5\frac{3}{4}$	November	7th	...	$5\frac{1}{16}$	November	6th	...	$5\frac{5}{16}$
"	15th	...	$5\frac{1}{16}$	"	14th	...	$5\frac{3}{4}$	"	13th	...	$5\frac{5}{16}$
"	22nd	...	$5\frac{9}{16}$	"	21st	...	$5\frac{5}{8}$	"	20th	...	$5\frac{3}{16}$
"	29th	...	$5\frac{7}{16}$	"	28th	...	$5\frac{5}{8}$	"	27th	...	$5\frac{1}{8}$
December	6th	...	$5\frac{5}{16}$	December	5th	...	$5\frac{5}{8}$	December	4th	...	$5\frac{3}{16}$
"	13th	...	$5\frac{7}{16}$	"	12th	...	$5\frac{5}{8}$	"	11th	...	$5\frac{3}{16}$
"	20th	...	$5\frac{3}{8}$	"	19th	...	$5\frac{9}{16}$	"	18th	...	$5\frac{1}{8}$
"	27th	...	$5\frac{3}{8}$	"	26th	...	$5\frac{9}{16}$	"	25th	...	$5\frac{1}{16}$

1891.			d.	1892.			d.	1893.			d.
January	1st	...	$5\frac{1}{2}$	January	7th	...	$4\frac{1}{10}$	January	5th	...	$5\frac{1}{10}$
"	8th	...	$5\frac{5}{10}$	"	14th	...	$4\frac{1}{2}$	"	12th	...	$5\frac{1}{2}$
"	15th	...	$5\frac{3}{10}$	"	21st	...	$4\frac{1}{2}$	"	19th	...	$5\frac{3}{10}$
"	22nd	...	$5\frac{1}{10}$	"	28th	...	$4\frac{1}{2}$	"	26th	...	$5\frac{3}{10}$
"	29th	...	5	February	4th	...	$3\frac{1}{10}$	February	2nd	...	$5\frac{2}{10}$
February	5th	...	$4\frac{1}{10}$	"	11th	...	$3\frac{3}{4}$	"	9th	...	5
"	12th	...	$4\frac{7}{8}$	"	18th	...	$3\frac{1}{10}$	"	16th	...	$4\frac{7}{8}$
"	19th	...	$4\frac{5}{8}$	"	25th	...	$3\frac{1}{10}$	"	23rd	...	$5\frac{1}{10}$
"	26th	...	$4\frac{1}{10}$	March	3rd	...	$3\frac{3}{4}$	March	2nd	...	$4\frac{1}{10}$
March	5th	...	$4\frac{7}{8}$	"	10th	...	$3\frac{1}{10}$	"	9th	...	$5\frac{1}{10}$
"	12th	...	$4\frac{1}{10}$	"	17th	...	$3\frac{1}{10}$	"	16th	...	$4\frac{1}{10}$
"	19th	...	$4\frac{7}{8}$	"	24th	...	$3\frac{5}{8}$	"	23rd	...	5
"	26th	...	$4\frac{7}{8}$	"	31st	...	$3\frac{9}{10}$	"	30th	...	$4\frac{1}{10}$
April	2nd	...	$4\frac{1}{10}$	April	7th	...	$3\frac{5}{8}$	April	6th	...	$4\frac{9}{10}$
"	9th	...	$4\frac{1}{10}$	"	14th	...	$3\frac{3}{4}$	"	13th	...	$4\frac{1}{2}$
"	16th	...	$4\frac{3}{4}$	"	21st	...	$3\frac{7}{8}$	"	20th	...	$4\frac{7}{10}$
"	23rd	...	$4\frac{3}{4}$	"	28th	...	$3\frac{7}{8}$	"	27th	...	$4\frac{6}{10}$
"	30th	...	$4\frac{1}{10}$	May	5th	...	$3\frac{1}{10}$	May	4th	...	$4\frac{1}{10}$
May	7th	...	$4\frac{1}{10}$	"	12th	...	$3\frac{1}{10}$	"	11th	...	$4\frac{5}{10}$
"	14th	...	$4\frac{1}{10}$	"	19th	...	$4\frac{1}{10}$	"	18th	...	$4\frac{3}{10}$
"	21st	...	$4\frac{1}{2}$	"	26th	...	$4\frac{1}{10}$	"	25th	...	$4\frac{1}{2}$
"	28th	...	$4\frac{3}{4}$	June	2nd	...	$4\frac{1}{8}$	June	1st	...	$4\frac{3}{10}$
June	4th	...	$4\frac{5}{8}$	"	9th	...	$4\frac{3}{10}$	"	8th	...	$4\frac{3}{8}$
"	11th	...	$4\frac{1}{10}$	"	16th	...	$4\frac{1}{10}$	"	15th	...	$4\frac{1}{10}$
"	18th	...	$4\frac{1}{2}$	"	23rd	...	$4\frac{1}{10}$	"	22nd	...	$4\frac{7}{10}$
"	25th	...	$4\frac{9}{10}$	"	30th	...	4	"	29th	...	$4\frac{7}{10}$
July	2nd	...	$4\frac{9}{10}$	July	7th	...	$3\frac{1}{10}$	July	6th	...	$4\frac{3}{8}$
"	9th	...	$4\frac{1}{2}$	"	14th	...	$3\frac{1}{10}$	"	13th	...	$4\frac{1}{2}$
"	16th	...	$4\frac{7}{10}$	"	21st	...	$3\frac{1}{10}$	"	20th	...	$4\frac{9}{10}$
"	23rd	...	$4\frac{3}{8}$	"	28th	...	$4\frac{1}{10}$	"	27th	...	$4\frac{1}{2}$
"	30th	...	$4\frac{1}{2}$	August	4th	...	4	August	3rd	...	$4\frac{1}{2}$
August	6th	...	$4\frac{1}{2}$	"	11th	...	$3\frac{1}{10}$	"	10th	...	$4\frac{7}{10}$
"	13th	...	$4\frac{7}{10}$	"	18th	...	$3\frac{1}{10}$	"	17th	...	$4\frac{1}{2}$
"	20th	...	$4\frac{9}{10}$	"	25th	...	$3\frac{1}{10}$	"	24th	...	$4\frac{1}{2}$
"	27th	...	$4\frac{1}{10}$	September	1st	...	$3\frac{1}{10}$	"	31st	...	$4\frac{1}{2}$
September	3rd	...	$4\frac{1}{2}$	"	8th	...	4	September	7th	...	$4\frac{5}{8}$
"	10th	...	$4\frac{1}{10}$	"	15th	...	4	"	14th	...	$4\frac{5}{8}$
"	17th	...	$4\frac{3}{4}$	"	22nd	...	$4\frac{1}{8}$	"	21st	...	$4\frac{1}{2}$
"	24th	...	$4\frac{7}{8}$	"	29th	...	$4\frac{1}{4}$	"	28th	...	$4\frac{5}{8}$
October	1st	...	$4\frac{1}{10}$	October	6th	...	$4\frac{7}{10}$	October	5th	...	$4\frac{5}{8}$
"	8th	...	$4\frac{1}{10}$	"	13th	...	$4\frac{3}{8}$	"	12th	...	$4\frac{1}{10}$
"	15th	...	$4\frac{3}{4}$	"	20th	...	$4\frac{7}{10}$	"	19th	...	$4\frac{9}{10}$
"	22nd	...	$4\frac{1}{10}$	"	27th	...	$4\frac{1}{10}$	"	26th	...	$4\frac{9}{10}$
"	29th	...	$4\frac{5}{8}$	November	3rd	...	$4\frac{1}{2}$	November	2nd	...	$4\frac{9}{10}$
November	5th	...	$4\frac{7}{10}$	"	10th	...	$4\frac{1}{10}$	"	9th	...	$4\frac{1}{2}$
"	12th	...	$4\frac{3}{8}$	"	17th	...	5	"	16th	...	$4\frac{1}{2}$
"	19th	...	$4\frac{1}{2}$	"	24th	...	$5\frac{3}{10}$	"	23rd	...	$4\frac{7}{10}$
"	26th	...	$4\frac{5}{10}$	December	1st	...	$5\frac{3}{10}$	"	30th	...	$4\frac{3}{8}$
December	3rd	...	$5\frac{5}{10}$	"	8th	...	$5\frac{1}{2}$	December	7th	...	$4\frac{1}{10}$
"	10th	...	$4\frac{1}{4}$	"	15th	...	$5\frac{3}{10}$	"	14th	...	$4\frac{1}{4}$
"	17th	...	$4\frac{1}{4}$	"	22nd	...	$5\frac{1}{4}$	"	21st	...	$4\frac{1}{4}$
"	24th	...	$4\frac{3}{10}$	"	29th	...	$5\frac{1}{4}$	"	28th	...	—

1894.			d.	1895.			d.	1896.			d.
January	4th	....	$4\frac{5}{10}$	January	3rd	....	$3\frac{1}{2}$	January	5th	....	$4\frac{9}{10}$
"	11th	....	$4\frac{5}{8}$	"	10th	....	$3\frac{2}{3}$	"	12th	....	$4\frac{9}{10}$
"	18th	....	$4\frac{5}{8}$	"	17th	....	$3\frac{1}{10}$	"	19th	....	$4\frac{1}{2}$
"	25th	....	$4\frac{1}{4}$	"	24th	....	3	"	26th	....	$4\frac{1}{2}$
February	1st	....	$4\frac{1}{4}$	"	31st	....	$2\frac{3}{2}$	February	2nd	....	$4\frac{9}{10}$
"	8th	....	$4\frac{1}{4}$	February	7th	....	3	"	9th	....	$4\frac{9}{10}$
"	15th	....	$4\frac{1}{4}$	"	14th	....	3	"	16th	....	$4\frac{1}{2}$
"	22nd	....	$4\frac{3}{10}$	"	21st	....	$3\frac{1}{2}$	"	23rd	....	$4\frac{1}{2}$
March	1st	....	$4\frac{3}{10}$	"	28th	....	3	March	2nd	....	$4\frac{1}{2}$
"	8th	....	$4\frac{3}{10}$	March	7th	....	$3\frac{1}{10}$	"	9th	....	$4\frac{1}{2}$
"	15th	....	$4\frac{1}{8}$	"	14th	....	$3\frac{2}{10}$	"	16th	....	$4\frac{1}{2}$
"	22nd	....	$4\frac{1}{8}$	"	21st	....	$3\frac{1}{2}$	"	23rd	....	$4\frac{1}{2}$
"	29th	....	$4\frac{1}{8}$	"	28th	....	$3\frac{5}{10}$	"	30th	....	$4\frac{1}{2}$
April	5th	....	$4\frac{3}{10}$	April	4th	....	$3\frac{3}{8}$	April	6th	....	—
"	12th	....	$4\frac{3}{10}$	"	11th	....	$3\frac{7}{10}$	"	13th	....	$4\frac{1}{2}$
"	19th	....	$4\frac{1}{8}$	"	18th	....	$3\frac{9}{10}$	"	20th	....	$4\frac{1}{2}$
"	26th	....	$4\frac{1}{10}$	"	25th	....	$3\frac{5}{8}$	"	27th	....	$4\frac{1}{2}$
May	3rd	....	$3\frac{1}{10}$	May	2nd	....	$3\frac{5}{8}$	May	4th	....	$4\frac{1}{2}$
"	10th	....	$3\frac{1}{10}$	"	9th	....	$3\frac{9}{10}$	"	11th	....	$4\frac{1}{2}$
"	17th	....	4	"	16th	....	$3\frac{3}{2}$	"	18th	....	$4\frac{1}{2}$
"	24th	....	4	"	23rd	....	$3\frac{5}{8}$	"	25th	....	—
"	31st	....	$4\frac{1}{10}$	"	30th	....	$3\frac{7}{8}$	June	1st	....	$4\frac{1}{10}$
June	7th	....	$4\frac{1}{10}$	June	6th	....	$3\frac{7}{2}$	"	8th	....	$3\frac{1}{10}$
"	14th	....	$4\frac{1}{10}$	"	13th	....	$3\frac{5}{8}$	"	15th	....	$3\frac{1}{10}$
"	21st	....	$4\frac{1}{10}$	"	20th	....	$3\frac{3}{2}$	"	22nd	....	$3\frac{3}{2}$
"	28th	....	4	"	27th	....	$3\frac{3}{2}$	"	29th	....	$3\frac{1}{10}$
July	5th	....	4	July	4th	....	$3\frac{3}{2}$	July	6th	....	4
"	12th	....	$3\frac{5}{10}$	"	11th	....	$3\frac{3}{2}$	"	13th	....	$3\frac{9}{10}$
"	19th	....	$3\frac{5}{10}$	"	18th	....	$3\frac{1}{10}$	"	20th	....	$3\frac{3}{2}$
"	26th	....	$3\frac{5}{10}$	"	25th	....	$3\frac{1}{10}$	"	27th	....	$3\frac{1}{2}$
August	2nd	....	$3\frac{1}{10}$	August	1st	....	$3\frac{1}{10}$	August	3rd	....	—
"	9th	....	$3\frac{7}{8}$	"	8th	....	$3\frac{9}{10}$	"	10th	....	$4\frac{9}{10}$
"	16th	....	$3\frac{7}{8}$	"	15th	....	$3\frac{9}{10}$	"	17th	....	$4\frac{1}{2}$
"	23rd	....	$3\frac{7}{8}$	"	22nd	....	$4\frac{3}{2}$	"	24th	....	$4\frac{5}{8}$
"	30th	....	$3\frac{5}{10}$	"	29th	....	$4\frac{7}{2}$	"	31st	....	$4\frac{9}{10}$
September	6th	....	$3\frac{7}{8}$	September	5th	....	$4\frac{7}{2}$	September	7th	....	$4\frac{9}{10}$
"	13th	....	$3\frac{3}{2}$	"	12th	....	$4\frac{1}{2}$	"	14th	....	$4\frac{1}{10}$
"	20th	....	$3\frac{9}{10}$	"	19th	....	$4\frac{1}{2}$	"	21st	....	$4\frac{3}{4}$
"	27th	....	$3\frac{1}{2}$	"	26th	....	$4\frac{7}{10}$	"	28th	....	$4\frac{3}{2}$
October	4th	....	$3\frac{5}{8}$	October	6th	....	$4\frac{3}{2}$	October	5th	....	$4\frac{1}{10}$
"	11th	....	$3\frac{5}{10}$	"	13th	....	$4\frac{3}{2}$	"	12th	....	$4\frac{1}{2}$
"	18th	....	$3\frac{7}{2}$	"	20th	....	$4\frac{3}{2}$	"	19th	....	$4\frac{1}{2}$
"	25th	....	$3\frac{5}{8}$	"	27th	....	$4\frac{5}{8}$	"	26th	....	$4\frac{1}{2}$
November	1st	....	$3\frac{1}{10}$	November	3rd	....	$4\frac{5}{8}$	November	2nd	....	$4\frac{1}{2}$
"	8th	....	$3\frac{1}{2}$	"	10th	....	$4\frac{5}{2}$	"	9th	....	$4\frac{1}{2}$
"	15th	....	$3\frac{5}{8}$	"	17th	....	$4\frac{3}{2}$	"	16th	....	$4\frac{1}{2}$
"	22nd	....	$3\frac{1}{8}$	"	24th	....	$4\frac{1}{2}$	"	23rd	....	$4\frac{1}{2}$
"	29th	....	$3\frac{3}{2}$	December	1st	....	$4\frac{1}{2}$	"	30th	....	$4\frac{1}{2}$
December	6th	....	$3\frac{3}{2}$	"	8th	....	$4\frac{5}{8}$	December	7th	....	$4\frac{3}{2}$
"	13th	....	$3\frac{1}{10}$	"	15th	....	$4\frac{9}{2}$	"	14th	....	$4\frac{1}{10}$
"	20th	....	—	"	22nd	....	$4\frac{3}{2}$	"	21st	....	4
"	27th	....	$3\frac{1}{2}$	"	29th	....	$4\frac{1}{2}$	"	28th	....	$4\frac{1}{2}$

1897.	d.	1898.	d.	1899.	d.
January 4th	$4\frac{1}{32}$	January 3rd	—	January 2nd	—
" 11th	$4\frac{1}{32}$	" 10th	$3\frac{1}{4}$	" 9th	$3\frac{1}{8}$
" 18th	$4\frac{1}{16}$	" 17th	$3\frac{7}{32}$	" 16th	$3\frac{1}{8}$
" 25th	4	" 24th	$3\frac{3}{16}$	" 23rd ..	$3\frac{1}{4}$
February 1st	$3\frac{5}{16}$	" 31st	$3\frac{3}{32}$	" 30th	$3\frac{5}{16}$
" 8th	$3\frac{9}{32}$	February 7th	$3\frac{1}{4}$	February 6th	$3\frac{9}{32}$
" 15th	$3\frac{5}{16}$	" 14th	$3\frac{3}{8}$	" 13th	$3\frac{7}{16}$
" 22nd	$3\frac{9}{32}$	" 21st	$3\frac{11}{32}$	" 20th	$3\frac{13}{32}$
March 1st	$4\frac{1}{32}$	" 28th	$3\frac{7}{16}$	" 27th	$3\frac{3}{8}$
" 8th	$3\frac{5}{16}$	March 7th	$3\frac{7}{16}$	March 6th	$3\frac{15}{32}$
" 15th	$3\frac{11}{32}$	" 14th	$3\frac{11}{32}$	" 13th	$3\frac{13}{32}$
" 22nd	4	" 21st	$3\frac{11}{32}$	" 20th	$3\frac{3}{8}$
" 29th	$3\frac{5}{16}$	" 28th	$3\frac{5}{16}$	" 27th	$3\frac{3}{8}$
April 5th	$4\frac{1}{32}$	April 4th	$3\frac{7}{16}$	April 3rd	—
" 12th	$4\frac{1}{16}$	" 11th	—	" 10th	$3\frac{3}{8}$
" 19th	—	" 18th	$3\frac{1}{2}$	" 17th	$3\frac{3}{8}$
" 26th	$4\frac{3}{16}$	" 25th	$3\frac{5}{8}$	" 24th	$3\frac{3}{8}$
May 3rd	$4\frac{1}{4}$	May 2nd	$3\frac{9}{32}$	May 1st	$3\frac{3}{8}$
" 10th	$4\frac{1}{4}$	" 9th	$3\frac{9}{32}$	" 8th	$3\frac{13}{32}$
" 17th	$4\frac{5}{32}$	" 16th	$3\frac{9}{16}$	" 15th	$3\frac{3}{8}$
" 24th	$4\frac{3}{32}$	" 23rd	$3\frac{1}{16}$	" 22nd	—
" 31st	$4\frac{1}{8}$	" 30th	—	" 29th	$3\frac{3}{8}$
June 7th	—	June 6th	$3\frac{9}{16}$	June 5th	$3\frac{13}{32}$
" 14th	$4\frac{3}{32}$	" 13th	$3\frac{7}{16}$	" 12th	$3\frac{3}{32}$
" 21st	$4\frac{3}{32}$	" 20th	$3\frac{15}{32}$	" 19th	$3\frac{13}{32}$
" 28th	—	" 27th	$3\frac{7}{16}$	" 26th	$3\frac{5}{16}$
July 5th	$4\frac{7}{32}$	July 4th	$3\frac{3}{32}$	July 3rd	$3\frac{11}{32}$
" 12th	$4\frac{7}{32}$	" 11th	$3\frac{7}{16}$	" 10th	$3\frac{11}{32}$
" 19th	$4\frac{1}{4}$	" 18th	$3\frac{7}{16}$	" 17th	$3\frac{5}{16}$
" 26th	$4\frac{1}{4}$	" 25th	$3\frac{3}{32}$	" 24th	$3\frac{3}{8}$
August 2nd	—	August 1st	—	" 31st	$3\frac{3}{8}$
" 9th	$4\frac{9}{32}$	" 8th	$3\frac{5}{32}$	August 7th	—
" 16th	$4\frac{1}{8}$	" 15th	$3\frac{7}{16}$	" 14th	$3\frac{9}{16}$
" 23rd	$4\frac{1}{8}$	" 22nd	$3\frac{5}{16}$	" 21st	$3\frac{7}{16}$
" 30th	$4\frac{1}{8}$	" 29th	$3\frac{11}{32}$	" 28th	$3\frac{9}{16}$
September 6th	$4\frac{3}{32}$	September 5th	$3\frac{9}{32}$	September 4th	$3\frac{5}{32}$
" 13th	$4\frac{3}{32}$	" 12th	$3\frac{9}{32}$	" 11th	$3\frac{9}{16}$
" 20th	$4\frac{1}{32}$	" 19th	$3\frac{3}{16}$	" 18th	$3\frac{17}{32}$
" 27th	$3\frac{15}{16}$	" 26th	$3\frac{1}{8}$	" 25th	$3\frac{1}{16}$
October 4th	$3\frac{13}{16}$	October 3rd	$3\frac{7}{16}$	October 2nd	$3\frac{11}{32}$
" 11th	$3\frac{13}{16}$	" 10th	$3\frac{3}{32}$	" 9th	4
" 18th	$3\frac{11}{16}$	" 17th	$3\frac{3}{32}$	" 16th	$3\frac{9}{32}$
" 25th	$3\frac{7}{32}$	" 24th	$3\frac{1}{16}$	" 23rd	4
November 1st	$3\frac{11}{32}$	" 31st	$3\frac{1}{32}$	" 30th	$4\frac{1}{32}$
" 8th	$3\frac{1}{4}$	November 7th	3	November 6th	$4\frac{1}{8}$
" 15th	$3\frac{7}{32}$	" 14th	3	" 13th	$4\frac{3}{32}$
" 22nd	$3\frac{1}{4}$	" 21st	$3\frac{1}{32}$	" 20th	$4\frac{1}{8}$
" 29th	$3\frac{1}{4}$	" 28th	$3\frac{5}{32}$	" 27th	$4\frac{9}{32}$
December 6th	$3\frac{1}{4}$	December 5th	$3\frac{1}{8}$	December 4th	$4\frac{13}{32}$
" 13th	$3\frac{7}{32}$	" 12th	$3\frac{5}{32}$	" 11th	$4\frac{5}{16}$
" 20th	$3\frac{3}{16}$	" 19th	$3\frac{3}{32}$	" 18th	$4\frac{11}{32}$
" 27th	—	" 26th	—	" 25th	—

1900.		d.	1901.		d.	1902.		d.
January	1st	—	January	7th	$5\frac{5}{8}$	January	6th	$4\frac{1}{2}\frac{5}{8}$
"	8th	$4\frac{1}{2}\frac{3}{8}$	"	14th	$5\frac{1}{2}$	"	13th	$4\frac{1}{2}$
"	15th	$4\frac{1}{2}$	"	21st	$5\frac{7}{32}$	"	20th	$4\frac{9}{16}$
"	22nd	$4\frac{1}{16}$	"	28th	$5\frac{1}{2}\frac{5}{8}$	"	27th	$4\frac{1}{2}\frac{5}{8}$
"	29th	$4\frac{3}{8}\frac{1}{2}$	February	4th	$5\frac{1}{16}$	February	3rd	$4\frac{1}{2}$
February	5th	$4\frac{3}{8}\frac{5}{32}$	"	11th	$5\frac{7}{16}$	"	10th	$4\frac{3}{8}\frac{9}{32}$
"	12th	$5\frac{1}{16}$	"	18th	$5\frac{1}{8}\frac{1}{2}$	"	17th	$4\frac{1}{16}$
"	19th	$5\frac{1}{16}$	"	25th	$5\frac{1}{8}\frac{1}{2}$	"	24th	$4\frac{2}{32}\frac{1}{2}$
"	25th	$5\frac{1}{8}$	March	4th	$5\frac{1}{8}$	March	3rd	$4\frac{1}{16}$
March	5th	$5\frac{9}{32}$	"	11th	$5\frac{1}{32}$	"	10th	$4\frac{2}{32}\frac{5}{8}$
"	12th	$5\frac{9}{16}$	"	18th	$4\frac{1}{32}\frac{3}{8}$	"	17th	$4\frac{1}{16}\frac{3}{8}$
"	19th	$5\frac{1}{2}\frac{5}{32}$	"	25th	$4\frac{5}{8}$	"	24th	$4\frac{3}{4}$
"	26th	$5\frac{1}{2}$	April	1st	$4\frac{9}{16}$	"	31st	—
April	2nd	$5\frac{9}{32}$	"	8th	—	April	7th	5
"	9th	$5\frac{1}{2}$	"	15th	$4\frac{9}{16}$	"	14th	$5\frac{1}{32}$
"	16th	—	"	22nd	$4\frac{5}{8}$	"	21st	$5\frac{1}{8}$
"	23rd	$5\frac{3}{32}$	"	29th	$4\frac{2}{32}\frac{1}{2}$	"	28th	$5\frac{1}{32}\frac{1}{2}$
"	30th	$5\frac{1}{2}$	May	6th	$4\frac{1}{32}\frac{1}{2}$	May	5th	$5\frac{1}{16}$
May	7th	$5\frac{7}{16}$	"	13th	$4\frac{3}{8}$	"	12th	$5\frac{1}{32}\frac{1}{2}$
"	14th	$5\frac{5}{16}$	"	20th	$4\frac{1}{2}\frac{5}{8}$	"	19th	—
"	21st	$5\frac{7}{32}$	"	27th	—	"	26th	$5\frac{1}{8}$
"	28th	$5\frac{5}{8}$	June	3rd	$4\frac{1}{32}\frac{1}{2}$	June	2nd	$5\frac{5}{32}$
June	4th	—	"	10th	$4\frac{1}{32}$	"	9th	$4\frac{3}{32}\frac{1}{2}$
"	11th	5	"	17th	$4\frac{5}{8}$	"	16th	$4\frac{3}{32}\frac{1}{2}$
"	18th	$5\frac{1}{32}$	"	24th	$4\frac{3}{4}$	"	23rd	$4\frac{1}{16}$
"	25th	$5\frac{1}{32}\frac{1}{2}$	July	1st	$4\frac{2}{32}\frac{3}{8}$	"	30th	$4\frac{3}{32}\frac{1}{2}$
July	2nd	$5\frac{3}{32}\frac{1}{2}$	"	8th	$4\frac{3}{32}\frac{1}{2}$	July	7th	$5\frac{1}{16}$
"	9th	$6\frac{1}{16}$	"	15th	$4\frac{1}{16}$	"	14th	$5\frac{3}{16}$
"	16th	$5\frac{2}{32}\frac{3}{8}$	"	22nd	$4\frac{1}{32}\frac{9}{8}$	"	21st	$5\frac{3}{32}$
"	23rd	$5\frac{3}{32}\frac{1}{2}$	"	29th	$4\frac{3}{8}$	"	28th	$4\frac{2}{32}\frac{9}{8}$
"	30th	$5\frac{2}{32}\frac{5}{8}$	August	5th	—	August	4th	—
August	6th	—	"	12th	$4\frac{7}{16}$	"	11th	$4\frac{1}{16}\frac{3}{8}$
"	13th	$5\frac{2}{32}\frac{1}{2}$	"	19th	$4\frac{9}{16}$	"	18th	$4\frac{2}{32}\frac{7}{8}$
"	20th	$5\frac{2}{32}\frac{1}{2}$	"	26th	$5\frac{1}{16}$	"	25th	$4\frac{2}{32}\frac{9}{8}$
"	27th	$5\frac{5}{8}$	September	2nd	5	September	1st	$5\frac{1}{32}$
September	3rd	$5\frac{1}{2}$	"	9th	$4\frac{1}{16}\frac{3}{8}$	"	8th	5
"	10th	$5\frac{3}{32}\frac{1}{2}$	"	16th	$4\frac{9}{32}$	"	15th	$4\frac{1}{16}\frac{5}{8}$
"	17th	$7\frac{1}{4}$	"	23rd	$4\frac{5}{8}$	"	22nd	$5\frac{1}{16}$
"	24th	$7\frac{1}{4}$	"	30th	$4\frac{1}{32}\frac{9}{8}$	"	29th	$4\frac{1}{16}\frac{5}{8}$
October	1st	$7\frac{5}{8}$	October	7th	$4\frac{3}{4}$	October	6th	4.84
"	8th	$6\frac{1}{2}$	"	14th	5	"	13th	4.76
"	15th	$6\frac{1}{32}\frac{3}{8}$	"	21st	$4\frac{2}{32}\frac{5}{8}$	"	20th	4.74
"	22nd	$5\frac{3}{32}$	"	28th	$4\frac{5}{8}$	"	27th	4.70
"	29th	$5\frac{5}{16}$	November	4th	$4\frac{7}{16}$	November	3rd	4.60
November	5th	$5\frac{3}{16}$	"	11th	$4\frac{5}{16}$	"	10th	4.52
"	12th	$5\frac{3}{32}\frac{1}{2}$	"	18th	$4\frac{9}{32}$	"	12th	4.42
"	19th	$5\frac{9}{16}$	"	25th	$4\frac{1}{32}\frac{1}{2}$	"	24th	4.58
"	26th	$5\frac{1}{32}\frac{1}{2}$	December	2nd	$4\frac{5}{16}$	December	1st	4.52
December	3rd	$5\frac{9}{32}$	"	9th	$4\frac{5}{8}$	"	8th	4.44
"	10th	$5\frac{1}{2}$	"	16th	$4\frac{5}{8}$	"	15th	4.54
"	17th	$5\frac{3}{8}$	"	23rd	$4\frac{2}{32}\frac{1}{2}$	"	22nd	4.56
"	24th	—	"	30th	$4\frac{1}{32}\frac{9}{8}$	"	29th	4.58
"	31st	—						

1903.			1904.			1905.		
		d.			d.			d.
January	5th	4.70	January	4th	6.88	January	6th	3.79
"	12th	4.72	"	11th	7.44	"	13th	3.80
"	19th	4.82	"	18th	7.54	"	20th	3.75
"	26th	4.74	"	25th	8.18	"	27th	3.68
February	2nd	4.88	February	1st	8.92	February	3rd	3.97
"	9th	5	"	8th	7.08	"	10th	4.09
"	16th	5.14	"	15th	7.26	"	17th	4.17
"	23rd	5.38	"	22nd	—	"	24th	4.17
March	2nd	5.36	"	29th	8.00	March	3rd	4.10
"	9th	5.20	March	7th	8.48	"	10th	4.19
"	16th	5.36	"	14th	8.78	"	17th	4.31
"	23rd	5.38	"	21st	8.10	"	24th	4.28
"	30th	5.36	"	28th	8.30	"	31st	4.28
April	6th	5.36	April	4th	—	April	7th	4.27
"	13th	—	"	11th	8.34	"	14th	4.24
"	20th	5.42	"	18th	7.96	"	21st	4.19
"	27th	5.48	"	25th	7.68	"	28th	4.16
May	4th	5.52	May	2nd	7.62	May	5th	4.24
"	11th	5.80	"	9th	7.58	"	12th	4.36
"	18th	6.26	"	16th	7.46	"	19th	4.39
"	25th	6.28	"	23rd	—	"	26th	4.61
June	1st	—	"	30th	7.06	June	2nd	4.70
"	8th	6.50	June	6th	6.62	"	9th	4.59
"	15th	7.12	"	13th	6.84	"	16th	4.80
"	22nd	6.78	"	20th	6.40	"	23rd	4.91
"	29th	6.92	"	27th	6.32	"	30th	5.34
July	6th	6.56	July	4th	6.10	July	7th	6.01
"	13th	6.32	"	11th	6.24	"	14th	5.82
"	20th	6.40	"	18th	6.50	"	21st	5.91
"	27th	6.64	"	25th	6.12	"	28th	6.01
August	3rd	—	August	1st	—	August	4th	5.90
"	10th	6.66	"	8th	5.94	"	11th	5.81
"	17th	6.80	"	15th	5.98	"	18th	5.80
"	24th	6.74	"	22nd	6.22	"	25th	5.87
"	31st	6.96	"	29th	6.64			
September	7th	6.32	September	5th	6.64			
"	14th	6.56	"	12th	6.76			
"	21st	6.40	"	19th	6.82			
"	28th	6.02	"	26th	6.62			
October	5th	5.92	October	3rd	5.80			
"	12th	5.82	"	10th	5.62			
"	19th	5.86	"	17th	5.50			
"	26th	5.82	"	24th	5.36			
November	2nd	5.78	"	31st	5.32			
"	9th	6.10	November	7th	5.34			
"	16th	6.12	"	14th	5.40			
"	23rd	6.08	"	21st	5.40			
"	30th	6.28	"	28th	5.28			
December	7th	6	December	5th	5.18			
"	14th	6.70	"	12th	4.25			
"	21st	7.14	"	19th	4.17			
"	28th	7.46	"	26th	4.27			

DISCUSSION *on* PROFESSOR CHAPMAN *and* MR. DOUGLAS KNOOP'S
PAPER.

THE CHAIRMAN said it was a great pleasure to him to be present on this occasion, as one who had watched the progress of the new universities from their birth. It was interesting to find in Professor Chapman a representative of the University of Manchester. The ability he had shown in his paper proved abundantly how great a service was being rendered by those in the new universities, the ample sphere of their operations, and the great benefit they were to the community. Their object was to bring science to the provinces in a manner which could not otherwise be accomplished. They would be all agreed that this paper amply proved the wisdom of those who founded those universities. He did not feel in a position to make any observations on the paper himself. They very often felt, after hearing a paper read, that they required time and opportunity for reflection before saying anything upon it, and that was especially the case that evening. As one of the Lancashire public, he had always looked on "futures" as the creatures of wild speculation and eminently uncertain, and he could not avoid a feeling of wonder that such operations could be reduced within the dominion of scientific investigation, which alone was a great step in advance.

MR. AUGUST F. WIENER said he had been connected with the cotton trade from 1857 until about twelve years ago, and perhaps he might be able to supplement some of the data which the author of the interesting paper just read had been able to obtain. Previously to the American war of 1860-64, the trade in future deliveries was unknown, but it followed as a necessity from the disturbance of the market caused by the war, and also as a natural consequence of the introduction of the submarine telegraph. Previously to the American war the average price of slave-grown cotton was about 6*d.*, but from 1860 it rose till about 1864, when he himself paid for American cotton 32½*d.* Thirty years later it was down as low as 3½*d.*, and those were about the extreme fluctuations known. Before the American war a cotton crop was considered excessively large if it produced 5,000,000 bales, but to-day the world's trade easily consumed 12,000,000 bales. During the American war it was necessary for spinners, and for speculators also, to look about them for supplies. They first bought East Indian cotton, but as that all came then round the Cape, and took from three to four months to come here, dealings in East Indian Cotton shipments for delivery after arrival were very considerable. On that form of trade was grafted afterwards the system of making contracts for delivery during a stated month. The terms of these contracts had gradually to be freed from imperfections, and by slow degrees the actual

method of dealing in cotton "futures" was started, and became a practical necessity when the introduction of telegraphs brought all business centres into hourly contact. At times when an American crop poured into the ports at the rate of several 100,000 bales a day, it could not be disposed of to consumers as fast as it arrived on the markets, so that a sort of intermediary cotton trade grew up, which consisted in wealthy houses investing money in actual cotton without running much risk; buying real cotton on the other side, and selling on this side for future delivery, thus avoiding the risk of unforeseen fluctuations of the market. This was an interesting side of the question which had not been touched on in the paper. As the shipments came forward these dealers would sort them on samples, and appropriate each particular class of cotton to the particular market where each class of cotton happened to be wanted. Spain would buy a different quality of cotton from that required for Belgium, and Lancashire wanted a different sort from what was wanted in Germany. In that way the intermediary could deal very largely in cotton without running any risk. He would sell his actual cotton on sample at a small premium, and buy back, at the same time and at the current prices of "futures," the sale contracts for delivery then open. If a manufacturer had entered into a contract for the sale of so many thousands of bales of cloths per month six or twelve months hence, he nowadays immediately went and bought "futures" against it, and possibly the purchaser of the cloth would sell cotton "futures." He thought the purely speculative side of the question had really been over-estimated, and he did not believe in syndicates, but he had seen individuals make large profits by dealing in cotton "futures." With regard to the fluctuation of prices, his experience had always been that it was greatly dependent on sentiment, and that sentiment was influenced by crop estimates and by other matters. During the American war, everybody thought that after the war was over, and with free labour, the future price of cotton would probably be 9*d.* or 10*d.* a lb., as against 6*d.*, which was the average price before the war. He saw from the figures in the paper that the price ranged from 9*d.* to 10*d.* until about the seventies, when it went down to about 6*d.*, because the cotton cultivation in America increased beyond all expectation. Still, cotton was different from all other articles of colonial produce, because somehow the crop seemed always to get consumed in the course of the year; it never left a very excessive surplus stock, and often far too small a margin of reserve. There was no other article of prime necessity worked with such very small surplus stocks to guard against fluctuations of price. The stock in Liverpool had run down several times to a figure equal to only a few weeks' consumption at the end of a crop year, and he knew of no other article in which things were cut so fine. The anticipation of such happenings was one of the great causes of fluctuations. In the case of coffee, which article was also largely dealt in for future delivery, the stocks carried were generally equal to about three months of the world's consumption, and sometimes more. But in cotton one did not see that; the consumption of

cotton always more or less kept abreast of the production. There was a time in the eighties or nineties when it looked as if the production of cotton was going beyond the powers of consumption, and then prices dropped down to 4*d.* and even 3*d.*; but since the close of the last century, probably owing to the great American prosperity, the scarcity of field hands, and the rising cost of labour, the price of cotton had been brought back to 6*d.* or even 7*d.*, which seemed to be about the normal price for the present. Indeed, it looked as if the demand for raw cotton was likely to grow faster than American cotton crops could be further increased in size. As regarded unforeseen fluctuations, things had happened in the past which were beyond all calculation; for instance, the outbreak of the Franco-German War in 1870 brought the price of cotton down 2*d.* in a fortnight. In 1878 the failure of the City of Glasgow Bank brought cotton from 7*d.* down to 5*d.* in a few weeks. That catastrophe was entirely unexpected, and it was much more connected with the general cotton industry than anybody knew when the announcement appeared in the paper; it had far reaching results, which probably affected the cotton trade for years afterwards. Those were things which statistics did not show, and he warned anybody actively engaged in the cotton trade not to rely on statistics or calculations, because his experience was that those who relied on mathematical theories of correlations of value, and thereon based market operations, almost invariably lost their money. A very dear friend of his made a number of diagrams of the crop movement some twenty-five or thirty years ago, and they cost him in a few months a large fortune, the result of twenty years previous hard work and of previous unusually successful trading. In practice prices did not move up and down in conformity with influences capable of mathematical demonstration. If there were more buyers than sellers in the market, prices did and must go up; if there were more sellers than buyers, prices declined. The preponderance of either buyers or sellers was due to an infinite variety of extremely complex causes very difficult to gauge. In the produce markets coming events threw their shadows before them, and these shadows had most frequently more influence than facts; but it was to be feared that no mathematical formula could be devised which could establish a correlation between prices and shadows.

Mr. R. H. HOOKER expressed his gratitude to Professor Chapman for bringing forward a paper of that character, showing the various directions in which he had attempted to find an answer to his problems, including all the "no thoroughfares." Such contributions were of great educational value in statistics. He also noted with approval the author's omission of the months of August and September in making certain of his calculations. To many people the omission of those months, which showed the greatest changes of all, might seem undesirable, and was certainly bold; but he thought this policy was fully justified in the instance quoted.

Referring to the British Association's Report of 1900, Professor Chapman had said he thought the object of that Committee was

different from his own, but it seemed to him (Mr. Hooker) to have been very much the same. In both cases the object was an investigation of the effect of "future" dealings upon prices; and though the Committee certainly had not devoted so much attention to cotton as to wheat, that was because the latter commodity seemed to offer greater possibilities of arriving at some definite conclusions.

Professor CHAPMAN said he believed the origin of that Committee was to investigate the truth of the assertion that "futures" tended to depress prices; the members of the Committee went on to discuss the whole question, but he thought they kept that in mind, though they went on to discuss whether "futures" unsteadied prices.

Mr. HOOKER thought that the effect on the steadiness of the price was one part of the effect on prices. The author also said that the Committee advanced no reasons for the view that it was a disputable point whether the actual money amount was not rather to be taken into account than the percentage as a measure of variability. The point had certainly seemed to the Committee to be disputable; but they had been careful to state that "the fact that, considered as a percentage of the price, the variability has hardly been reduced, is equally noteworthy." He was not prepared to affirm that the one measure was better than the other, but he certainly thought there were various reasons for as well as against taking the actual values. One point which weighed with him on this question was that in many cases it was certainly the actual price-movements which mattered. If, for instance, a farmer who was growing wheat spent on labour, &c., 25s. to produce one quarter, and got 30s., it was no means the same to the farmer if the cost rose to 50s., and the price of wheat to 60s. In the one case he made 10s., in the other only 5s., although the percentage increase on his outlay was the same. Or, if one bought wheat at prices ranging from 25s. to 30s., it was not the same thing to the purchaser as if they ranged from 50s. to 60s. The point to be considered was often the residuum left to spend on other things, and this was much greater in the case where wheat was lower; the percentage on the residuum was at least double. This would have held with even greater force, say, thirty years ago, when incomes were somewhat lower and people spent a much larger proportion upon bread. A change in the price of wheat was then relatively far more important than the same percentage change would be now. That was one of the considerations floating through his mind in that connection. Another consideration was that prices were made up of a large number of factors, some of which were variable and some were not. The invariable parts ought not in such cases to be taken into account, as was done when one reckoned by percentages. This consideration might have great force in comparing foreign statistics. To take, for instance, wheat in England. If it were at 25s. and went up to 30s., that was an increase of 20 per

cent. Prices in Germany and England moved *pari passu*, but one would not expect the German price to go up 20 per cent. Assuming a duty in Germany of 12s. per quarter, that was an invariable amount; and if the price at any time were 37s. there as against 25s. in England, a corresponding advance would be to 42s., not to 44s. or 45s. The rise in Germany would be 14 per cent. and in England 20 per cent., but it would not therefore be right to say that the price in Germany was more stable because the percentage change was less. As to cotton, he did not know whether in Germany or in France there was any import duty or not; if there were, that fact would considerably vitiate any conclusions drawn from the third of the tables on p. 335. If, however, there were no duty, that table was not necessarily wrong; it was simply "disputable."

In the footnote on p. 334 the author said, "Mr. Hooker admitted in his paper to this Society that his conclusions were 'probable only.'" This seemed to him a very broad generalisation from the particular. The problems he had set himself in that paper were two, viz., had the price of grain at Berlin been (1) raised or lowered, (2) rendered more or less steady? He had concluded with a pretty categorical statement that they had certainly not been raised and certainly not been steadied, but that they had been lowered, and in all probability rendered less stable. Possibly Professor Chapman was generalising from the last of these conclusions, or perhaps from the fact that some particular lines of investigation had proved to be "no thoroughfares," although other lines had led to definite conclusions. In this connection he might, perhaps, be allowed to point out that in the "Conclusions," section II, the author attributed any increased steadiness which set in with the use of "futures" in the seventies and eighties to concomitant changes in other economic factors, but he did not seem to recognise or examine the effect of concomitant changes in other economic factors when the price grew less steady of later years. There he seemed more decided, and stated that the probability was that organised speculation of late years had unsteadied prices. It appeared to him that the hypothesis of other concomitant changes was just as applicable in the later period. One consideration, of which much had been heard of late years, was the notorious uncertainty of the official estimates of the cotton crop made in America. These had undergone considerable criticism of late as being unreliable, and must have had a very unsettling influence on the market. Although cotton prices had apparently been less stable of late years, he doubted whether that was the case with wheat. There had certainly been some increase in the mean weekly movement of the "Gazette" price from 1890 to 1900, especially as shown by the percentages (of course the Leiter corner was a factor in this). But since 1900 he fancied the price of wheat had been remarkably steady; in fact, in three or four of the years abnormally so, scarcely changing from week to week.

Mr. Hooker also had some difficulty in following exactly what Mr. Chapman had done in correlating the "spot" and "future"

prices on p. 344, and he thought the explanation preceding the table of coefficients might with advantage be expanded, as well as an interpretation given of the results. If he understood Professor Chapman correctly, he had correlated "spot" with the difference between the price of "futures" of the next and four following months. It appeared therefore that practically he was correlating "spot" with the slope of the lines in Diagram III. Expressing the numerator of the correlation coefficient as $\Sigma(xy)$, he would be glad if Mr. Chapman would confirm his assumption that x was the difference between the "spot" price on any day and the average "spot" price of the season, and that y was the difference between the slope on any day and the average slope of the season. He gathered that when the slope was less marked (*i.e.*, when there was less difference than the average between near and distant "futures") this was taken as positive?

Professor CHAPMAN replied that a smaller difference than the average between near and distant "futures" had been taken as negative.

Mr. HOOKER said that in that case the coefficients (when negative) indicated that when "spot" was high the slope was greater than the average. Had current "futures" been taken instead of "spot," such a result would be absolutely in accordance with *à priori* considerations, since it was well known that near "futures" were less stable than distant, but the connection of "spot" prices with this slope was not so clear. But it was very singular that in some years a high positive coefficient was obtained, and it was very difficult to deduce anything from such opposite coefficients, nearly all of which were fully high enough (in comparison with their probable errors) to justify the statement that the two sets of curves were correlated. He would much like to know what interpretation Professor Chapman was inclined to put upon them.

Mr. OWEN FLEMING said he had been impressed by the observations of the chairman to the effect that "futures" were rather things to be avoided if possible, and he supposed that in England they would all prefer to take that view. But, as cotton was grown chiefly in the United States, and had to be bought under the laws of that country, they were bound by legal decisions there; and the decision of the Supreme Court which was given on 8th May, 1905, made it perfectly clear that American law would protect dealing in "futures" to almost any extent. That being so, he did not see how any action on their part could get rid of it, and, as the largest purchasers in the world of raw cotton, they had to accept the situation. It was therefore with very great pleasure that he had listened to this very able examination of this question by Professor Chapman, whose knowledge of the subject was probably second to that of no man in this country. But when he endeavoured to reduce to mathematical law the workings of the New York Stock Exchange he had undertaken a very difficult task. The business

relations between the New York merchants and the cotton growers were very intimate, and the New York firms were thus enabled to form a shrewd opinion as to what was likely to happen six, nine, or even twelve months ahead. This knowledge, in the light of their accumulated business experience, profoundly influenced dealings in "futures." Then, as the year wore on and the distant "futures" gradually approached the change in the crop year, so the influence of the new crop told more and more powerfully. And, therefore, what he might call the tail-end of the "futures" curve was always being influenced more and more by the new crop which was coming on month by month as time advanced. When cotton was quoted at, say, 8*d.*, all the States in the cotton district immediately set to work to produce cotton, with the result of a huge crop. Mr. Wiener had spoken of 12,000,000 bales as a crop possible to swallow, but he fancied that within the last three or four years there had been a crop equal to 13,500,000 bales, and it was not possible to swallow all that, some being held over, though a great portion of it was swallowed. Consequently, the supply exceeding the demand, prices came down from something like 8*d.* or 9*d.* to 3*d.* or 4*d.* Obviously, a crop of 13½ millions of bales would not be grown while prices remained at 4*d.*; the land would be more economically utilised in growing wheat, and that was what happened. Then once again demand equalled supply, and the New York people foreseeing that, "futures" again went up. But, with this game going on, he did not see how the movement of "futures" could be reduced to mathematical law, and this paper practically proved that. The author tried method after method in endeavouring to arrive at some mathematical conclusion, but found "no thoroughfare" written up against him in every road he tried. If he, coming from the University of Manchester, the centre of the cotton world, took that line, what was the line Manchester merchants were going to take in this matter? They could not be content to give up the problem as impossible. They must take some line. Last year, for example, Great Britain exported some 92,000,000*l.* worth of woven cloth, considerably more than one-fourth of the total exports of the country. Obviously the British people were bound to watch this question most carefully. He thought the real solution was to be found in the accumulation of a large crop reserve in Lancashire, and that seemed to be the policy which was being adopted. "The Economist" of last week gave the stock of raw cotton in the Liverpool market as 1,067,000 bales, which was worth, roughly, 12,500,000*l.* If this worked out at 3½ per cent., it came to something like 9,000*l.* a week, which was rather a big weight on Lancashire. But it seemed to him that it was Lancashire's only policy to build up a large cotton reserve, and if necessary sink many millions of capital into that reserve. They could then afford to let New York prices swing up and down as they chose. If "futures" were high, they would come down in time if people did not buy. When prices were low, buying could be resumed. That seemed to him the policy that was being followed. The increase had been very rapid in the last two

years, and it appeared that if Lancashire would continue steadily to pursue that course, the cotton industry would be greatly strengthened. He felt very grateful for this paper, which deserved the most careful examination and study.

Professor CHAPMAN said he should like to ask Mr. Hooker and Mr. Fleming and any others who had studied the matter, whether they could explain the movements as between near and distant "futures" illustrated in Diagram III, because he was not by any means satisfied about the explanation ventured in the paper. Even when "futures" did not run into the new crop year, how was it that sometimes the near "futures" had a higher price in relation to the distant "futures" than at other times? Sometimes the more distant "futures" were the most expensive, and sometimes the cheapest. He should like to know whether Mr. Fleming had any theory upon that, because he thought it was a thing yet to be explained. Mr. Hooker had done a good deal of investigation upon the question of the effect of "futures," and he would like to know if he had any explanation to offer.

Mr. HOOKER said he had not sufficient experience of these matters to offer an explanation. He could only suppose that such changes were due to the anticipation that some months ahead the supply would, relatively to the present, be short or large, except in cases of temporarily rigging the market.

Mr. WIENER said that if a majority of operators in a market thought the price was going down, there would be more sellers than buyers, and therefore they would be selling far ahead at relatively lower prices than "spot" cotton commanded, which was only bought for current requirements. If, on the other hand, a number of people wished to speculate in the market, and had a good opinion of the future position of the article, they would not mind paying 1*d.*, 2*d.*, or even 3*d.* a pound more for six months ahead. He received when in Havre on one occasion one single order, which put up the market immediately 2 or 3 per cent.

Mr. FLEMING said he thought the new crop year had an influence quite far back into the old crop year.

Mr. WIENER said the new year crop had an influence all the year round. First one had the news of the preparation of the ground, then the number of acres sown, and then the weather; and as the season progressed one got estimates—first, second, and third. It was a perfect cycle all the year round.

Professor CHAPMAN said these explanations were similar to the one advanced in the paper, and they certainly seemed probable, but he was not convinced that there were not other important influences to take into account.

Professor CHAPMAN, in reply, said there was room for a great deal of further investigation upon the question of the effects of "futures." With regard to the point raised by Mr. Hooker, the reason why they laid stress upon stating the indices of steadiness as percentages was that they were definitely concerned with the question of steadiness—he took it as a matter of definition that the price was steadier if the percentage variation was less—and were not discussing the question whether rising percentage variations or rising absolute variations affected the consumer most.¹ As regarded their language when dealing with concomitant variations, they granted readily, and wanted that point to be made quite clear, that their conclusions were open to exactly the same defects as those which they criticised; they only put forward their views as to the effects being wrought by dealing syndicates and the gambling of the public very tentatively as a possible explanation of recent movements in price variations. It might be that other concomitant changes had taken place in the last seventeen years. The observation in the note on p. 334 as to the conclusions of Mr. Hooker's paper was meant to refer only to his conclusions upon the effect of "futures" on the steadiness of prices, and the authors thought they were correctly stating Mr. Hooker's views in saying that in his opinion his conclusions upon this point were probable only. The authors would be glad to alter their phraseology if they had inadvertently mis-stated Mr. Hooker's views. He felt grateful to Mr. Hooker for pointing out certain errors which the authors had overlooked in reading over their paper, many of the figures in which had not yet been verified.

The following were elected Fellows of the Society:—

Arkell, George Edward.
De Vine, John Montague.
Lucas, Thomas Mackworth.

Perkins, Herbert Henry Webb.
Williams, David.

¹ See note now inserted on p. 332.