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PRICE EFFECTS OF SCALPING AND DAY TRADING

This paper must cover a good deal of ground in a short time and it cannot include much of the data that support its assertions, or any detailed description of the methods used to get needed information. ^{1/} The two principal methods that have been used are: (1) statistical analysis of characteristics of price movement; and (2) gathering information directly from traders -- partly trading records, and partly statements about what such traders do, and why. By combining these two methods I have learned a good deal more than I could have learned from either one separately. Most important, perhaps, each method has served as a check against the other. Several times I would have drawn mistaken inferences by depending only on results of statistical analysis, or only on what I thought that traders meant by what they said.

Scalping and day trading are two sorts of intra-day trading. That is, both seek to take advantage of price changes that occur within the day. In scalping, the interval between purchase and sale, or between a sale and a subsequent purchase, is ordinarily not more than a few minutes. In day trading, the interval may be an hour or more. There are other differences between these two sorts of intra-day trading that give better reason for distinguishing between them than the mere difference in lengths of the normal interval over which positions are held, but we may better discuss those other differences a little later.

^{1/} The detailed information, gathered mainly under a research grant from the Merrill Foundation for Advancement of Financial Knowledge, will appear in a book that is in preparation.

Some pertinent data that give a rough indication of relative amounts of intra-day trading in wheat by different classes of traders appear in Table 1. The indications are especially rough because the data from which the table was compiled cover all Chicago futures combined, so that interoption arbitrage transactions (purchase of one future against sale of another) are not separately distinguishable, and have here been counted as "apparent intra-day trading", with the result that the proportion of all transactions accounted for by intra-day trading is overstated by the table. The over-statement is greatest for traders classed as hedgers, who do no true intra-day trading, or virtually none; (even when a hedger buys and sells futures for the same delivery month in one day, it is not normally with the object of profiting from price changes within the day). Total intra-day trading on the day covered by the table may be estimated as appreciably less than the 14.4 million bushels of "apparent" intra-day trading shown for "speculators", which was 62 per cent of total trading for the day. Over three-fourths of this total of 14.4 million bushels of apparent intra-day trading was accounted for by "floor traders" -- members of the exchange executing transactions for their own accounts on the floor of the exchange.

A considerable number of the men listed as floor traders are engaged principally in executing trades for others, but do a little trading also for their own accounts. Among these were the thirty traders in class a, ii, who held no overnight positions and who bought and sold less than 100 thousand bushels each

1/ Purchase of one future against sale of another, as we shall see later, sometimes does deserve to be counted as intra-day trading, but a great deal of it should not be so counted.

TABLE 1. -- ANALYSIS OF TRADING AND OPEN CONTRACTS IN
CHICAGO WHEAT FUTURES
SEPTEMBER 18, 1947, BY CLASSES OF TRADERS

(Numbers; thousand bushels; percent)

Class of Traders	Number of Traders with		Amount of Trading			Initial Open Contracts	
	Con-tracts ^{a/}	Trans-actions	Appar-ent	Oth-er ^{c/}	Per cent	Long	Short
			Intra-day ^{b/}		Intra-day		
I. Speculators, total	4,219	1,312	14,375	5504	72	83,228	40,255
1. Floor traders, ^{d/} total	182	133	11,031	700	94	15,421	13,188
a. Zero overnight position ^{e/}							
i. Sold 100,000 bu. or more	5	5	1,100	0	100	0	0
ii. Sold less than 100,000 bu.	30	30	800	0	100	0	0
b. Overnight position even ^{f/}	54	23	2,870	0	100	5,570	5,570
c. Small overnight net position ^{g/}	31	31	4,964	129	97	3,336	3,242
d. Other floor traders ^{h/}	62	44	1,297	571	69 ^{j/}	6,515	4,376
2. Other members of exchange	85	46	987	850	54 ^{j/}	12,370	7,680
3. Non-members	3,950	1,048	2,357	3954	37	55,437	19,387
II. Hedgers	475	131	1,184	2250	35 ^{j/}	21,577	64,951
Total	4,694	1,443	15,559	7754	67 ^{j/}	104,805	105,206 ^{k/}

*Data compiled from mimeographed reports of Commodity Exchange Authority to Senate Committee on Appropriations, November 24, 1947, and January 5, 1948.

^{a/} Numbers of traders holding open contracts during at least part of the day.

^{b/} Purchases accompanied by an equal amount of sales within the day, but not necessarily for the same delivery month; includes arbitrage transactions, transfers of hedges between delivery months, and some other transactions that were not true intra-day trading.

^{c/} Sums of net purchases or sales during the day, divided by two; the division corrects for the double counting that arises from adding purchases and sales, since each transaction must involve both a buyer and a seller.

^{d/} Exchange members listed by the Commodity Exchange Authority as executing transactions for their own accounts on the floor of the exchange.

^{e/} No open contracts at either the beginning or the end of the day.

^{f/} Equal long and short positions in different futures, at both the beginning and the end of the day.

^{g/} Net position at both the beginning and the end of the day not over one-tenth of the maximum volume of trading done on that or either of the two following days.

^{h/} With net positions exceeding 10 per cent of the maximum trading done on that or either of the two following days; includes several whose net position was only 1 thousand bushels, but whose transactions on any one day totaled less than 10 thousand bushels.

^{j/} These percentages significantly overstate the proportion of true intra-day trading in the category; see Note "b" above.

^{k/} Inequality between long and short open contracts reflects slight error in the basic data.

on the date to which the table applies. Nearly three-fourths of the total amount of apparent intra-day trading by floor traders (8,104 thousand bushels) was accounted for by 32 floor traders who each did 100 thousand bushels or more of apparent intra-day trading. Only 5 of these (class a, i) were wholly without commitments at both the beginning and the end of the day; 6 held "spread" positions only; 18 held relatively small net positions; and 3, in class d, held net positions of 85, 100, and 185 thousand bushels, respectively, at the beginning of the day.

The volume of intra-day trading on an exchange tends to vary from day to day, and from month to month, in direct proportion to the amount of total trading. Table 2 shows that during a ten-month period at Chicago the trading of persons classed as scalpers, in both wheat and corn, constituted a nearly constant percentage, month by month, of the total trading in the commodity. Chart 1 shows graphically the correspondence between these scalpers' trading and total trade in each of these commodities day by day during two weeks in which fluctuations in daily volume of trading were especially frequent and wide. The persons classed as scalpers for the purpose of Table 2 presumably correspond closely with those floor traders in classes a and c of Table 1 who normally did a large amount of trading, plus a few of those in class b of Table 1.

The fact that Table 2 shows slightly less than half as much trading by scalpers in corn as in wheat, in proportion to total futures trading in each commodity, may reflect in part some peculiarity in selection of the persons classed as scalpers for the purposes of the tabulation. However this may be, it is generally true that the sort of specialized intra-day trading commonly known as scalping is most prominent in the most active markets. This is partly because a relatively inactive market offers less opportunity than an active one for specialization by traders

Table 2. -- Relation of Scalper's Trading to Total Trading
in Wheat and in Corn Futures at Chicago, 1927*

(Million bushels; per cent)

Month	Wheat			Corn		
	Total	Scalpers	Percent Scalping	Total	Scalpers	Percent Scalping
Jan.	599	133	22.2	240	27.8	11.6
Feb.	493	108	21.9	269	29.7	11.0
Mar.	788	176	22.3	399	46.0	11.5
Apr.	712	151	21.2	287	23.3	8.1
May	1094	246	22.5	650	69.8	10.7
Jun.	1001	243	24.3	863	79.6	9.2
Jul.	863	190	22.0	541	59.2	10.9
Aug.	958	235	24.5	672	82.7	12.3
Sept.	699	179	25.6	787	89.4	11.4
Oct.	722	182	25.2	550	66.0	12.0
Total	7929	1843	23.2	5258	573.5	10.9

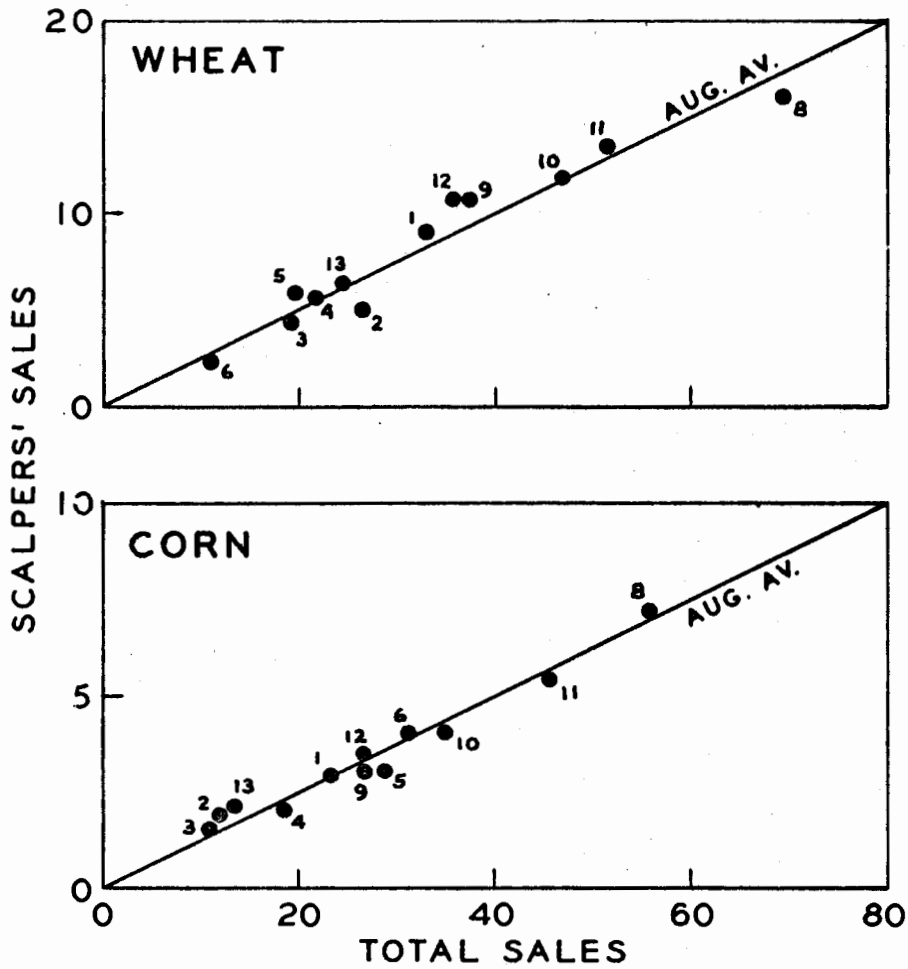
* Data from Reports by Members of Grain Futures Exchanges, Part 2, Senate

Document No. 123, 71st Congress, Tables A-34, A-66.

CHART 1.--RELATION OF SCALPERS' TRADING TO TOTAL TRADING IN WHEAT AND IN CORN FUTURES

AT CHICAGO, AUGUST 1-13, 1927*

(Million bushels)



* Data from same source used for Table 1.

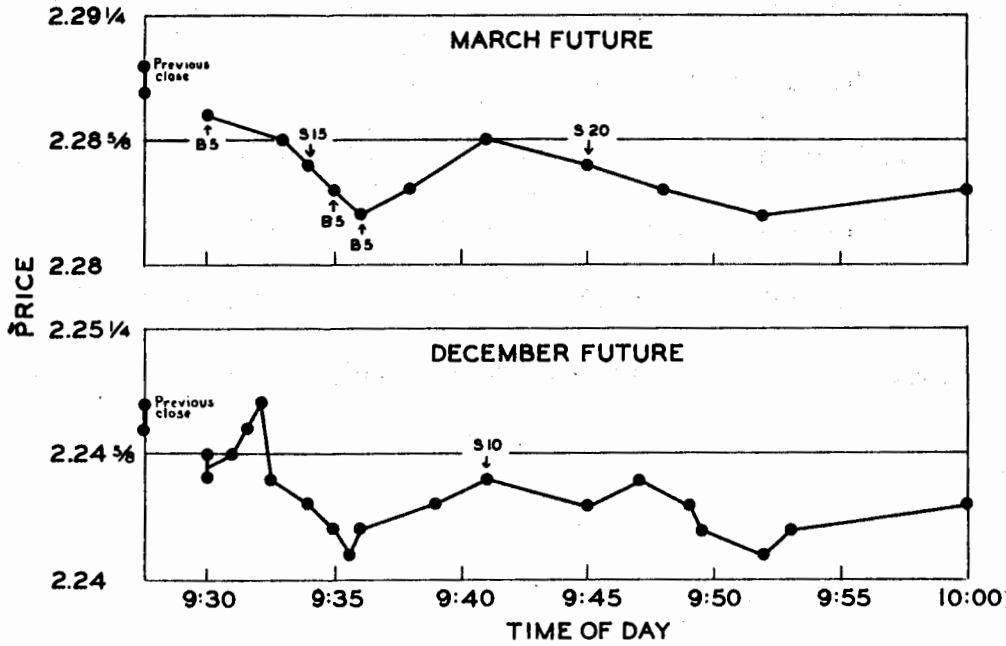
in any particular sort of trading, and partly because intra-day trading is difficult when transactions are infrequent.

Chart 2 gives a record of price changes in wheat and of the trading done by one scalper, Mr. A., during 20 minutes on a morning in September when the market was very dull. The price curves, it will be noticed, look as though the price never stood at the same figure for two successive transactions. This, of course, was not the case, for it often happens that several successive transactions are made at the same price. The price curves appear as they do merely because the available quotations did not record the price and time on each transaction, but only the price and time on each transaction that was made at a price different from the last price.

Mr. A. was doing his scalping at this time principally in the March future. The market opened, at 9:30, with prices about 1/4 cent per bushel under the previous close; and at the opening Mr. A. bought 5 March wheat (that is, 5000 bushels). Four minutes later he had decided that this was a mistake and seized an opportunity to close out his long position at a loss of 1/4 cent per bushel, and to go short an additional 10 March wheat. A minute later he bought 5 March at a 1/8 cent profit, and a minute later yet he bought another 5 March at a 1/4 cent profit.

Five minutes later, March wheat sold 3/8 cent higher than at the time of Mr. A's last transaction, but he did not succeed in making a sale of March at that price. So instead he sold 10 December. At 9:45, more buying came into the pit and Mr. A. sold again -- 20 March, -- though he had to take a price 1/8 cent below the previous one. He was now short a total of 30 thousand bushels in

CHART 2.--PRICE CHANGES IN CHICAGO DECEMBER AND MARCH WHEAT AND
TRANSACTIONS OF ONE SCALPER DURING THIRTY MINUTES*



* Arrows indicate prices at which transactions were made (B, bought; S, sold; numerals, thousand bushels.)

March and December wheat together. By 9:52, quoted prices showed profits for him of 3/8 cent on the sale of December and 1/4 cent on the sale of March. Perhaps Mr. A. would have taken these profits except for the fact that he had paused in his trading to talk with me. A few moments later he interrupted the conversation and went back into the pit to try to avoid having his profit turn into a loss. I fear that his courtesy to me proved expensive.

The foregoing illustration is somewhat unrepresentative of scalping in wheat just because it is a record for a period when the market was exceptionally inactive. On a moderately active morning, Mr. A. would have done as much business in five minutes as he was able to do this morning in twenty minutes.

SCALPING

We have now made a quick survey of some pertinent information and can begin to look more closely at scalping and day trading -- scalping first.

The usual sort of definition given for scalping (a scalper is commonly said to make many purchases and sales during a day, and to end the day without outstanding commitments) does not distinguish between it and day trading. A better characterization is one that was given me by a former president of the Chicago Board of Trade, a man who had formerly spent a good many years executing trades on the floor. He said: "A scalper stands always ready to either buy at 1/8 cent below the last price or to sell at 1/8 cent above the last price".

This is scarcely a definition, because it must immediately be qualified. It applies particularly to wheat; scalpers in soybeans ordinarily will buy only at 1/4 cent under the last price, or sell at 1/4 cent over the last price. Moreover, under some market conditions a scalper in wheat will trade only on 1/4-cent price changes, or even, under the most extreme conditions, on 1/2-cent changes. It is also not true that a scalper is always equally willing either to buy or to sell. Nor is it true that a scalper will never buy except at a price below the last one. Yet, despite all these qualifications, the foregoing characterization of scalping seems to me to indicate the essential nature of the business better than any other snort statement that I have met or have been able to devise.

Scalping is a difficult and complicated business and cannot be fully described in any short statement. The best that one can do in a single characterizing sentence is to express the essential feature of scalping, and that is done well

by saying that a scalper stands ready either to buy at 1/8 cent below the last price or to sell at 1/8 cent above it. The qualifications that must be made to this statement do not detract from its essential truth, but add further information on the nature of scalping.

There are circumstances under which a scalper can operate successfully in almost exactly the simple way that the foregoing statement indicates -- or, more accurately, there have been such circumstances, when futures markets did more business than they have done in recent years. Such scalping may be called simple scalping. In order for a scalper to operate thus with success, there must be a fairly high probability that any price change of 1/8 cent will be followed by a change in the opposite direction, rather than by a further change in the same direction. During the years prior to World War II, when there was much more trading in Chicago wheat futures than recently, it was common for prices of the dominant wheat future to fluctuate in such a way that price changes of 1/8 cent in either direction tended to be followed by opposite changes 75 or more times out of 100. $\frac{1}{8}$ In these circumstances, simple scalping could be profitable.

1/ A sampling study covering 143 series of 100 price changes each, eleven such series in each of the thirteen years, 1927-1930 and 1931-1940, gave the following results:

Number of price changes opposite						
to previous change, per 100 changes	65	70	75	80	85	90
Percent of price series with above						
or larger percentage of price reversals	98	81	58	37	18	5

The series tested were for the May future, centered on times picked at random in January of each year.

The tendency for small price changes in one direction to be followed by a price change in the opposite direction more often than by further change in the same direction may be called price jiggling. All futures prices that I have studied show at least some jiggling tendency. The basic cause of the jiggling is the desire of many speculative traders, and most hedgers, to make their purchases and sales promptly after having decided on them. An urgent buyer must often have to pay a little higher price than an equally urgent seller would receive, unless both happen to place their orders at the same time. Coming often at different times, such orders tend to cause a jiggling of the price.

Scalpers tend to limit the size of price jiggles, because they compete among themselves, and when a broker with a buying order cannot fill it otherwise, the scalper who offers to sell at the lowest price gets the business. If prices did not change for other reasons, the price changes associated with the jiggling caused by "market" orders would be very small indeed. With prices continually subject to change for other reasons, the effect of competition among scalpers is to keep the usual size of such changes so small that the jiggling tendency is hard to detect except by calculating the proportion of small price changes that are in a direction opposite to the immediately previous changes. Scalpers compete so effectively that under most circumstances nowadays no trader can make a living by simple scalping. A scalper must find means to obtain a better ratio of profits to losses than would result if he merely followed the rule for simple scalping.

There are various aids on which scalpers rely, and it would not be possible to explain all in half an hour, or in an hour, any more than it would be possible to

fully explain any other kind of business so briefly. What scalpers commonly say in attempting a brief explanation is that they try to judge the "trend" of the market. They do not mean by this that they seek to make their profits from the trends, but rather that they seek, by judging the trend, to improve their chances for a scalping profit. When a scalper thinks that the momentary trend of the market is down, he may try to sell on any 1/8 cent price advance, but to buy only if he can do so at 1/4 cent below the last price. Or he may follow a practice of avoiding long positions when he thinks that the trend is down, buying and selling very much as he would do otherwise except that he buys only to cover short positions that he has previously taken. If, on the other hand, a scalper thinks that the momentary trend of the market is upward, he tries to do the opposite of what has just been described: he may be willing to buy at 1/8 cent under the last price, but to sell only if he can get 1/4 cent over the last price; or he may simply follow a practice, while he thinks that the trend is up, of avoiding short positions, selling only to liquidate long positions previously taken.

Another method that scalpers use, especially if they are trading in relatively inactive futures, is a sort of "hedged" scalping. A scalper may buy one future, because he has a chance to buy at what seems a low price, and soon afterward sell a different future. If an hour or more elapses before he has a chance to match his first purchase with a sale in that same future, he may have to sell at a loss, but if so, there will probably have been a decline also in the price of the second future, so that he will make a profit on it. This sort of trading might be called scalping spreads between futures -- a sort of arbitrage, -- but the scalpers I know who practice it seem to regard it merely as a way of keeping down their risks while scalping inactive futures. So I have called it hedged scalping.

Scalping two or more futures concurrently, as just described, may involve dealing only in different futures for the same commodity and market; it may involve dealing in the same commodity in different markets -- wheat in Kansas City and in Chicago, for example; or it may involve dealing in different commodities, such as rye and wheat, or lard and cottonseed oil. A versatile trader may operate in all three of these ways on the same day and almost at the same time, having scalping transactions in half-a-dozen different commodities and a dozen different futures on the same day, and day after day. Such trading requires a mental capacity similar to that of a man who can play half-a-dozen different games of chess simultaneously, blindfolded.

In considering scalping, one tends to ask, "What is the average rate of profit made by scalpers?" The idea that there exists any meaningful average rate of scalping profit is, I fear, illusory. Scalping is a business that involves taking losses on a large proportion of the trades made, and the net result depends primarily on the ratio of profits to losses, which varies greatly according to the ability of the individual scalper. One should probably seek, not an average rate of profit for all scalpers, but a figure representative of the earnings of the ablest scalpers. The best data that I happen to have on profits of an able trader who was doing nearly pure scalping are a two-month record for a trader in cotton at New York. His transactions, summarized in

the tabulation below, showed profits, before commissions, of 23 cents per thousand dollars worth of sales. In wheat, this would be equivalent to about one-twentieth of a cent per bushel.

Month	No. of trans- actions <u>a/</u>		Avg. daily sales (Million pounds)	Gross profit <u>b/</u>		No. of days with	
	Total	per day		Cents per lb.	Per cent	Gain	Loss
Feb.	1701	77.4	4.9	.0167	.042	15	7
Mar.	1343	64.0	4.2	<u>c/</u>	<u>c/</u>	13	8
Total	3044	70.8	4.6	.0093	.023	28	15

a/ Purchases and sales.

b/ Per pound or per dollar of sales.

c/ Infinitesimal; a gross profit of \$187.00 on \$35 million of sales.

DAY TRADING

For what I know about day trading, a great deal is owed to the efforts of one such trader to educate me. He had been told by a mutual friend that I wanted a detailed record, over a short period of time, of the transactions of a day trader; quantities, prices, and exact time of day, so that I could relate the transactions to the day's record of all price changes. He knew that I could not possibly learn very much about day trading merely from such a record, but he wished to help; so he said that he would keep such a record for a week, but that he wanted also to give me notes on the reasons for each transaction. The resulting record, when transcribed, filled three to four single-spaced typewritten pages per day. Afterwards he answered many questions on points concerning which I found the notes obscure.

Two facts readily became clear from this record. One was that he often remarked that certain of his transactions were merely scalping. The other fact that emerged clearly was that he was paying a great deal of attention to all the news and information that would interest a trader concerned with price changes over intervals much longer than those over which he normally held positions. Sometimes his actions were directly motivated by long-run considerations. For example, after talking to a friend who calculated that soybeans were selling 10 cents per bushel too high in relation to prices of soybean oil and oil-meal, he promptly sold a large quantity of soybeans. And he saw no inconsistency between this action and the fact that within 10 minutes he bought back most of the soybeans that he had sold, for the sake of scalping profits of only 1/8 to 3/8 cent per bushel. He was shifting nimbly from action on long-run considerations to action on scalping considerations.

It was also clear that much of the time this trader was trying to "go with the market" -- to buy quickly when he sensed that prices were starting up, and to sell when they were starting down. The advantages he felt in doing that are suggested by a remark about soybean oil, (made at a time when the volume in soybean oil futures was much less than since) in which he did a good deal of trading. The "trouble with a thin market like that", he wrote, "is that you can't wait until you see a turn developing and then act, because [then] all offerings disappear. You have to buy when the market is weak and sell when it's strong, which of course is very risky". But the critical question of how he recognized "a turn developing", in any sort of market, was not clearly answered by any of his explanations. How did he distinguish between buying that started an upward movement which would continue, and buying that caused an upward movement which would amount to only a fraction of a cent, and would be followed by a similarly small reaction?

In fact, his judgments in this respect were often mistaken, though he was one of the most successful day traders on the floor. To the extent that he did distinguish successfully between buying or selling that marked the beginning of a substantial price movement and buying or selling that would not continue, the record seems to me to indicate that in most cases there was little in the nature of the buying or selling itself to mark the difference. Instead, his day trading was successful largely because he was continually seeing reasons for expecting price changes, on the basis of information of many kinds, and was always ready to act quickly when the price seemed to be starting to move as he expected. In a broad and active market he could limit his risks by waiting for some confirmation of his expectations, but in a thin market, as he said in the quotation above, "you can't wait until you see a turn developing". Sometimes he was at a loss to know

what to expect. Then one finds in the notes such remarks as these: "I was even and hadn't a clue, so decided to take it very easy today"; and later, "Best thing was to sit on the sidelines, as I was doing".

Was this day trader acting in such a way as to tend to improve the functioning of the markets in which he dealt? When he was scalping, his actions were clearly such as tended to restrict the jiggling of prices. His day trading in thin markets, where he had to do his buying when the price was weak, and his selling when the price strong, also clearly tended to restrict price movements. But what about his trading with the market, which he liked to do often; did it tend to amplify price movements when he bought at times when others were buying, and sold at times when others were selling? The record seems to me to allow either of two conflicting interpretations. One may argue from it that his trading of that sort contributed to the instability of futures prices; or one may argue that its tendency was to speed up price changes that were going to occur in any case, and that, having bought at the beginning of a price advance, he would later sell and help to check any tendency for the movement to go too far. It seems to me impossible to prove from this record, or from analysis of any number of similar records, which of these interpretations of the effects of day trading is correct. That can be judged only with the help of an analysis of price behavior.

But before we turn to another subject I should add some information on the average rate of profit realized by this trader. To the extent that he was merely scalping, he was operating principally in relatively inactive futures, in which scalping profits tend to be larger per thousand dollars worth of the

commodity than in the more active futures. Besides doing scalping and day trading, he did a little day-to-day speculation, where the profit rate on competent speculation tends to be higher than on day trading. For a seven-month period that he characterized as particularly successful, he reported a gross profit averaging 70 cents per 1000 dollars of purchases. In terms of wheat, that is equivalent to about 1/7 cent per bushel.

SOME OBSERVATIONS ON PRICE BEHAVIOR

To test the actual behavior of futures prices in their intra-day fluctuations, I have used statistical measures especially devised for testing the characteristics of speculative prices. The tests involve calculation of an index, designated as "H", which I call an "index of continuity". In a series in which changes in one direction tend to be followed by further change in the same direction, either immediately or after a short pause, this index gives positive values. That is, positive values of the index of continuity indicate a tendency for price movements, once started, to continue. If calculation of the index gives a negative value, that indicates the opposite of continuity, namely a tendency for price movements in one direction to be followed, either immediately or after a little pause, by movement in the opposite direction -- what may be called a reaction tendency. The index may be calculated for time-intervals of any desired length, so that the results answer the question whether there was continuity of price movement or, conversely, a tendency toward movement-and-reaction, within intervals of some specified length.

Since we are just now interested in the nature and effects of intra-day trading, the question of most immediate interest is whether or not the larger price movements within a day have tended in fact to be followed by opposite movements (reactions). The first tests that I made lumped all days together, without discrimination, and seemed to indicate that there was neither any tendency for price movements to be followed by opposite movements, nor any tendency for them to be followed by further movement in the same direction. This, of course, could scarcely be true, since we know that professional traders do make money on intra-day trading based on price tendencies which must involve either reaction or continuity of price movement.

A useful clue to the sort of price tendencies used by able intra-day traders was provided by a record of the trading in wheat, day by day over ten months, of a large-scale trader who sometimes traded heavily in and out during the day, sometimes confined his trading chiefly to accumulating or liquidating a position held for more than a day, and sometimes did little or no trading. I tested the characteristics of price movement on the days when he traded heavily in the two different ways, with the following results:

<u>Kind of trading</u>	<u>No. of days</u>	<u>Index of price continuity</u>
Chiefly intra-day	59	+ 0.080 ± .037 <u>a/</u>
Chiefly net purchase or sale	22	+ 0.009 ± .061

a/ The figure following the ± sign is the standard error of the index preceding it. An index value is of doubtful significance unless it is at least twice as large as its standard error.

When I made this test, I expected to find that the days on which this man traded heavily in and out were days in which price movements tended to be followed by reactions within the day. The opposite proved to be the case: the days when he did chiefly intra-day trading were days showing an average index of continuity of + .080, indicating a tendency for the larger price movements within the day to be followed by further movement in the same direction, rather than by opposite movement.

Further investigation indicated that in general there are two sorts of tendencies in intra-day price movements. One is the jiggling tendency already discussed, a tendency for very small price changes to be followed more often by opposite changes rather than by further changes in the same direction. The other is a tendency for any large price changes to occur gradually, so that large price changes during part of a day tend more often to be followed by further

change in the same direction later in the day, rather than by subsequent price reaction. The result of this combination of tendencies is that a test of price behavior on days when there were no large price movements ^{1/} shows merely the effect of the reaction tendency associated with price jiggling. A test of price behavior on days when price changes were unusually large shows a clear tendency toward continuity of price movement within the day. And on days of an intermediate sort, there is just enough continuity of movement associated with the larger price changes to about cancel the effect of the jiggling tendency on the test index, so that the index gives no clear indication of the presence of either the reaction tendency associated with the jiggling, or the tendency toward continuity in the moderate-sized price movements that do occur. The following tabulation shows the results for wheat prices, based on a record for 251 consecu-

1/ Amount of price movement during a day was measured by the average price range during four intervals of about one hour each during the day. In classifying days according to amount of price movement during the day it is necessary to use a measure like this in order to avoid biasing the results. If days were classified according to the price range for the entire day, the results would be biased in the direction of showing continuity on days of large price range; if days were classified according to net price change for the day, an even stronger bias would be introduced. The fact that the classification method used does not introduce such a bias has been demonstrated mathematically.

tive days classed in the three groups indicated, with approximately one-fifth of ^{2/} the days included in each of the extreme groups.

Amount of price movement during day	No. of days	Index of price continuity, <u>H</u>
Slight	45	- .112 \pm .042 ^{a/}
Small to moderate	150	\pm .021 \pm .022
Large	56	\pm .073 \pm .035
All days	<u>251</u>	\pm .005 .007

^{a/} Index, followed by its standard error.

These results indicate that most thinking and discussion on the subject of intra-day price fluctuations has been based on a delusion. We have thought that futures prices were excessively volatile; that price fluctuations within the day tended to be excessive, and that a substantial price movement, lasting through half-an-hour or an hour during a trading session, tended as a rule to be followed by a price reaction. Believing that to be the case, it was natural to suppose that the actions of professional intra-day traders, other than simple scalpers, might be such as to increase the supposed tendency for price movements to go too far, requiring correction through subsequent price reaction. But the results of the statistical tests cited above, and other similar results that I cannot summarize here, require revising our thinking. We must start from a demonstrated fact that futures prices tend to be sluggish; that as a rule their price changes, other than those involved in their tiny jiggles, tend to be gradual and not followed by reaction. Day traders, when they buy as prices are beginning to rise, certainly tend by their actions to accelerate the price increases. If the day traders, having bought near the beginning of a price rise, sold only after the rise had stopped,

^{2/} The price data are for January-October 1927, the period covered by the trading record mentioned in the previous paragraph.

their selling would tend to produce a price reaction. That sometimes happens, but it is not the general rule; there exists no general tendency toward reaction from the larger intra-day price changes. We have to conclude, therefore, that in most instances day traders who buy near the beginning of a price rise, sell before the rise is at an end. In so doing, they not only avoid tending to cause a price reaction, they tend also to limit the amount of the price rise.

The argument just given in terms of price increases applies equally to price decreases. Day traders who sell near the beginning of a price decline evidently tend to buy back before the decline has fully run its course, so that their actions usually speed up the decline, but tend to limit its extent.

CONCLUSIONS

Finally, let me try to summarize what I have said regarding scalping and day trading, and to draw some conclusions regarding their price effect.

The difference between scalping and day trading is fairly clear in principle. Scalping involves trading on the tiny jiggles of speculative prices, buying when urgent selling by others seems to allow purchasing at a price that is a little low in view of the general market situation, and selling when urgent buying by others seems to allow getting a price that is a bit high. Day trading, on the other hand, involves trading on price fluctuations larger than the jiggles. Sometimes the pattern of action in day trading closely resembles that in scalping, involving buying when the price seems temporarily low, and selling when the price seems temporarily high; and sometimes the pattern of action in day trading is quite different from that in scalping, involving initial buying when the price seems to be starting up, and initial selling when the price seems to be starting down.

In practice, scalping and day trading may be hard to distinguish. Except under conditions most favorable to scalping, the scalper has to bring to his aid some of the methods of the day trader. As for day trading, it is probably always combined with a great deal of mere scalping. Because the two kinds of trading are hard to distinguish, most people on the exchanges, in my observation, do not try to distinguish between them. Thus we often find scalping defined in terms that include day trading. But those who do day trading recognize it as something distinctly different from scalping, requiring different techniques and much more extensive information.

The price effect of scalping is commonly said to be that of limiting the size of price changes. This is true in a broad sense, but it is only a partial truth.

It may not be true that a decrease in the amount of scalping in wheat, for example, would tend to cause individual price changes in wheat prices at Chicago to be larger than the 1/8 cent which is now usual. The effects of scalping, and of the intense competition among scalpers, are primarily that they decrease the frequency with which changes of 1/8 cent are followed by further change in the same direction, and that they decrease the size and relative frequency of those price changes which are followed by opposite changes.

As for day trading, I shall speak only of the effects of the professional type of day trading, not of the more or less amateurish operations of small traders. It seems to have two tendencies: To speed the occurrence of price movements that would occur in any case, and to moderate any tendency for such movements to go so far that reaction tends to occur.

The fact that scalping and day trading can be done with profit is evidence of some degree of imperfection in price behavior. If, for example, the price of May wheat, prior to the month of May, reflected always the best estimate that could be made at that moment, from existing information, as to what the price would be in May, then no speculator could make any profit except by chance. But in taking advantage of the maladjustments of price that make it possible to gain profits from scalping and day trading, successful traders tend to restrict the size and shorten the duration of such maladjustments. Scalpers restrict the jiggling tendency in prices; day traders tend to accelerate price movements that will occur in any case, and to check any tendencies for movements to over-run. In so doing, scalpers and day traders tend to limit the opportunities for scalping profit, and their success in that respect is well reflected in the small magnitude of the profits per bushel, or per thousand dollars worth of purchases, of even the most successful scalpers and day traders.

CHAIRMAN OTTESON: Thank you very much, Doctor. Now who has the first question for Professor Working?

DR. WORKING: This may be the point for me to make one more comment. I believe there are in the room two or three people who really know a good deal more about this subject than I do. They know enough to make their living out of this business. Perhaps we could draw out some expressions on the subject from one or two of these men.

MR. CHARES W. MILLER, Assistant Professor, College of Business Administration, Marquette University: On page 18 you told us that the day trader makes equivalent to a seventh of a cent a bushel on wheat. How many bushels does he trade in per day?

DR. WORKING: If I may restate, I said that one "day trader" gave me those figures for one particular period.

MR. MILLER: Yes, I understand.

DR. WORKING: The table for the scalper is the only one that I have on quantities, and this man had average daily sales of cotton for the two months of 4.6 million pounds per day.

MR. MILLER: Yes sir, that is quite evident from the table; but on page 18, if I may refer to that again, we are talking about wheat, and the average profit you state from this one trader over a seven-month period is 1/7th of a cent a bushel. If he did seven million, it is a factor; if he did 70,000, it isn't so much. So I cannot relate his income unless I have the amount he traded in.

DR. WORKING: I don't mean to dodge your question, but you see this man did very little trade in wheat. As a matter of fact, I converted the figures

to wheat for the sake of giving something we could understand. It was 70¢ per thousand dollars of trade.

MR. MULLEN, University of Illinois: I understand scalpers are interested in an eighth of a cent profit per bushel. If it turns out on page 18 that he averages 1/7th of a cent a bushel profit, that means that on the average he is batting better than a thousand per cent accuracy, or does it?

DR. WORKING: That is explained by the fact that this man was a day trader rather than a scalper. He was aiming at larger amounts. Also he was trading not in wheat, but in inactive commodities largely. Also his trading included some day-to-day speculation. It would be very difficult, I think, to get a figure that would be pure scalping; but if one wants it, the figure for this cotton trader which we have reduced to an equivalent of about a twentieth of a cent would correspond to scalping profits.

MR. MULLEN: He would be right about two times out of three?

DR. WORKING: Yes.

MR. FRANK L. SIMMONETTI, Head, Industrial Management Department,

Akron University: It is a highly interesting paper but I note a lot of the data is as of 1927. I wondered how significant much of that is at the present moment?

DR. WORKING: I have data which I could not undertake to include here that comes down to last year. I don't find any general difference as between the 1927-1928 data and those for the more recent years, nor have I been able to find what looks like a significant difference between wheat and corn, or wheat and soybeans.

CHAIRMAN OTTESON: Do we have any further questions?

MR. ALFRED L. SEELYE, Chairman, Department of Marketing, Resources and Transportation, University of Texas: Did you find any difference

in the volume of business that they are doing between the data that you have here and your more recent data since the amount of hedging operations on the Exchange has changed between the two periods under consideration?

DR. WORKING: I have made only incidental comparisons. It is hard to tell at any time accurately just how much intra-day trading really goes on. It is a technically difficult thing to get more than a rough indication. Perhaps as good an index as any of change in amount of intra-day trading is the change in rate of turnover of the open interest, the average number of days that a contract is held open. On the basis of such a criterion, the amount of intra-day trading in wheat at Chicago would seem to have declined somewhat since 1946. In Kansas City it has risen. In general, it is less in the less active markets, more in wheat than in corn, more in corn, I suppose, than in oats.

MR. W. GEORGE PINNELL, Assistant Dean, School of Business, Indiana University: I just wanted to ask a question about how representative do you consider these two men to be, whom you worked with --- the scalper and day trader; how representative do you feel they are of brokers on the Exchange? I ask the question because I wonder if your conclusions are based on the results of observations of these two particular people?

DR. WORKING: First, let's speak of scalpers. There seems to be no difference of opinion at all as to the way the scalper ideally operates. The real issue is how does the day trader operate and what are the effects of his operations upon price behavior?

Day traders operate differently. No one man, perhaps, operates quite like another man. As I said, in the paper, I think that it is impossible to determine

simply from a record of the trading, (even if everybody would do as this one man so generously did by trying to explain to me why each transaction was made) I still don't think you could infer the price effect reasonably. But one has to draw the conclusions primarily from the statistical test of the price behavior and then use what the people tell you about their manner of operations as a means of interpreting what you observed to be the actual behavior of the prices.

CHAIRMAN OTTESON: We want to thank you again, Dr. Working, for your very fine presentation.