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## A NEW LOOK AT SOME OLD EVIDENCE: THE WHEAT MARKET SCANDAL OF 1925

Futures market speculators have frequently been blamed for variations in grain prices. In periods of rising prices (e.g., the early 1920s, the Korean war, inflation, and the 1970s) grain speculators have been accused of increasing the prices of agricultural commodities artificially. During the early 1930s when agricultural prices were low, grain speculators were accused of depressing prices. The role speculators actually play in determining market prices is a subject long open to debate. This paper analyzes the relationship of speculators to price in the wheat market for the crop year 1924, a time of volatile prices and little regulatory constraint.

The price of the May 1925 futures contract, the last contract dealing with the 1924 wheat crop, advanced from 1.19% per bushel in July 1924 to 2.05% at the end of January 1925.<sup>1</sup> After an uncertain February when the price moved roughly between 1.75 and 2.00, the price broke, hitting a low of 1.35% on April 3. (By way of contrast the May 1924 wheat future had traded throughout its life in a band between 1.00 and 1.15.) This decline outraged wheat producers and moved the United States Department of Agriculture (USDA), through the Grain Futures Administration (GFA), to undertake a thorough examination of the grain futures trade.<sup>2</sup>

The investigation raised two issues which were frequently confused in discussions of the events. The most significant charge leveled against the speculators was that large purchases were made in order to move market prices to levels unwarranted by supply and demand conditions. The argument goes that as the price was driven up, the public was drawn into the market to relieve the large speculators as their original long positions were covered. The second charge

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<sup>&</sup>lt;sup>1</sup> These and other price and volume data are from U.S. Congress (1926).

<sup>&</sup>lt;sup>2</sup> The investigation resulted in three major reports, U.S. Congress (1926), and two papers by J.W.T. Duvel and G. Wright Hoffman (1927, 1928).

dealt with large daily fluctuations in prices that were thought to be caused by excessive speculation. Both of these supposed effects of speculation have been called manipulation at one time or another, and while this labeling may be effective rhetorically, it clouds the true content of the specific charges. Manipulation should be defined as the deliberate, knowing, or intentional creation of unwarranted or artificial prices. Squeezes and corners are clearly forms of manipulation, and when traders purposely influence the price of a commodity a week or a month in the future by their trading today, this too is manipulative. Calling daily price swings that result from large scale trades manipulative seems to stretch the logic too far. If a trader tries to cover a large long position rapidly, the price will probably break, causing any paper profits to be diminished or possibly reversed. Only if the large trade occurs prior to the price change can there be a possibility of a manipulative content. Large fluctuations in price provide poor signals to producers and consumers and therefore are undesirable, but they do not imply manipulation.

The GFA investigators approached the analysis of the May 1925 contract systematically and carefully. They first examined the trading behavior of three individuals who were reported in the popular press to have manipulated the market. They found that one represented a hedging account, the second was a relatively minor trader, and the third did not participate in the market during this time. The analysis then moved to a broader statistical investigation. Statistics of daily volume and open interest were compared with the daily prices. A statistical analysis of price and volume data cannot address the issue of manipulation directly. What can be analyzed is the price effect of trades made by individuals or groups. If a significant price effect is found, it is then necessary to establish that the trade was intended to drive the price to an artificial level for manipulation to be proved. If on the other hand it is found that speculators' trades did not cause any price changes, then they certainly did not cause any unwarranted changes and manipulation can be rejected. The conclusions the USDA drew from the price and trading data were based on their interpretation of the evidence and assumptions concerning intent and artificiality of price.

On 60 percent of the days when there were individual sales or purchases of 500,000 bushels or more, price moved in the same direction (purchases producing price increases, sales producing declines). The same test for trades of two million bushels or more produced like price movements 76 percent of the time. This nonparametric analysis was supported by an examination of the correlation between changes in net position by class of trader and change in price. The report concludes from this "that the net purchases or sales . . . on a single day will usually cause the price to move in the same direction" (Senate, 1926, p.67). Of course, simple correlation analysis cannot imply the direction of causality, but the results are consistent with this intuitive explanation of events.

The examination of the broader issues of manipulation over time was made by graphical inspection. Plots of net positions of large traders were compared to plots of price levels. The conclusion from this fairly crude inspection was that the group of largest traders "either had far greater insight into the future regarding the course of grain prices . . . or else the course of its trading from day to day directed, in no small measure, the course of grain prices" (Senate, 1926, p. 51).

The ability to predict the future course of prices, often called discounting in the literature, is viewed as legitimate speculation in that it is trading that is borne out by the conditions of supply and demand. The GFA investigators in their conclusion rejected this interpretation of the observed trading pattern. G. Wright Hoffman (1941) in a 15-year (1923–38) survey of the grain markets also argued against the discounting explanation for two reasons. First, large speculators were not consistent in their individual or collective behavior, suggesting that the apparent discounting was not in fact due to any special skills or fundamental knowledge. The second factor was the precipitous decline in price from the \$2.00 level, which after the fact was deemed unwarranted.

The findings of the investigation did not immediately lead to new legislation, though in late 1925, at the urging of the Secretary of Agriculture, the Chicago Board of Trade began implementing machinery that would permit the imposition of limits on daily price movements in times of emergency. There were many who believed that this was not sufficient and argued that the Grain Futures Act of 1922, which relied almost exclusively on the exchanges policing themselves, contained only a shadow of the regulatory force that the situation called for.<sup>3</sup> There were cries that the markets were nothing but gambling dens, and that all forward contracts not explicitly designed for physical delivery should be outlawed. More moderate voices called for federal imposition of limits on daily price movements and on the levels of individual traders' daily volume and open interest in any given contract. After a decade of debate the Commodity Exchange Act of 1936 significantly amended the 1922 act.

Several major changes in the regulation of the markets resulted from the 1936 act, but of particular interest to this study was the creation of speculative limits. The events of 1925, the GFA investigations, and the widely held belief in the manipulative impact of large speculators were important in the passage of the bill. Representative John Marvin Jones of Texas in presenting the act on the floor of the house stated (U.S. Congress, 1935, p. 8589):

During the last 15 years about 16 big traders in grain have from time to time taken advantage of unusual conditions to make raids upon the market and to rig the market to the detriment not only of the producer but also of all others engaged in legitimate transactions in various farm commodities... The bill provides that the Commission which was established in the original act shall have the power to limit the net-short position or the net-speculative position of any one of the big traders at any time so as to avoid manipulation of the market.

The act itself, in Section 4a... imposing speculative limits, specifically mentions "excessive speculation" causing "unreasonabale fluctuations" or "unwarranted changes."

Because graphical inspection of open interest and prices may be open to a great deal of subjective interpretation, this study employs cross correlation techniques to examine the broader issue of interday manipulation. David Rutledge (1977)

<sup>3</sup> Excellent summaries of early legislation of commodity futures trading may be found in Hoffman (1932) and in Yale Law Journal (1951).



CHART 1. - PRICE AND VOLUME, MAY 1925 WHEAT\*

\* Data are for successive Wednesdays, from U.S. Congress (1926), "Fluctuations in Wheat Futures," Senate Document No. 135, 69th Congress, 1st Session, Washington, D.C., p. 17.

used similar techniques to investigate the links between trading volume and price changes and found them to be useful time series tools. By examining the 1925 data in this way a sounder interpretation of the events can be provided.

#### THE PRICE AND TRADING DATA

With so few constraints on speculation, the focus of the Secretary's investigation was on the behavior of the members of the Board of Trade who were classified as "large" traders. Detailed information about price movements and trading behavior of various classes of members were presented and analyzed. Daily movements of prices and total volume traded in the May contract are presented in Chart 1. The bulk of the finely detailed statistics gathered by the study was for the period of price decline (January 2 to April 18). From the point of view of the USDA, this made good sense because it was the period of highest volume and price variability, but it constrains the present study to the same

Class	Volume of trading		Percent of total volume	
	Bought	Sold	Bought	Sold
Large traders				
Commission houses	693,667	690,346	15.0	14.9
Hedgers	137,275	103,791	2.9	2.2
Scalpers	1,060,960	1,061,002	22.9	22.9
Speculators	615,087	652,005	13.3	14.1
Spreaders	58,401	54,042	1.3	1.2
Speculative scalpers	667,690	666,801	14.4	14.4
Total	3,233,080	3,227,987	69.8	69.7
Other traders	1,402,491	1,407,584	30.2	30.3
Total all traders	4,635,571	4,635,571	100.0	100.0

#### TABLE 1. – VOLUME OF TRADING IN 1925 MAY WHEAT BY CLASSES OF TRADERS, JANUARY THROUGH APRIL\* (Thousands of bushels)

\* Data from U.S. Congress (1926), "Fluctuations in Wheat Futures," Senate Document No. 135, Washington, D.C., p. 29.

period. Ideally the statistical series should include the autumn period of price increase as well. However, if this earlier period was not characterized by a speculative price effect, the inclusion of these data could dilute any effect alleged to be present in the volatile spring months.

The USDA study identified 627 traders who each bought or sold as much as 100,000 bushels of May wheat within a single day. These large traders comprised six categories: 1) commission houses, 2) hedgers, 3) scalpers, 4) speculators, 5) spreaders, and 6) speculative scalpers. They were responsible for about 70 percent of the total volume of trade in the May contract (Table 1).

The activities of the commission houses represent, by and large, the trading of small speculators who may be thought of as the outside participants in the market: they are people who want to invest in commodities at levels that would not justify the purchase of a seat on the exchange. Since they must trade through a broker their access to market information is not as immediate as that of traders who are active on the floor.

Hedgers are traders, like terminal elevator operators and large millers, who own cash wheat somewhere, and tend to maintain cash positions of the crop corresponding to their futures contracts. Most hedgers would not take or make delivery on their futures contracts because this would involve the costs associated with cash transactions in Chicago.

The primary function of scalpers, or pit traders, is to add liquidity to the market. They rarely hold a position overnight. During the period of study, they bought 1,060,960,000 bushels of May wheat and sold 1,061,002,000 bushels.

Their market behavior virtually precludes their having any sustained price influence.

Speculators are individuals who trade on a relatively large scale as compared with those making up the "general public" (Senate, 1926, p. 26). During the life of the May contract these traders made up about 14 percent of the total volume. It should be noted that combining this group with commission house traders does not exhaust the group of speculators. What it captures are the large traders (100,000 bushels or more) and the small (who do not own seats).

The GFA was particularly interested in a group of the very largest speculators. They found that 57 of the 302 traders in the group of speculators held at some time net positions of 500,000 bushels or more. Twelve traders in this group held between one and two million bushels, and eight others held over two million bushels in net positions at some time. Detailed statistics of volume and open interest are available for these 20 largest traders and data for this subgroup are used in the next section.

Spreaders and speculative scalpers are difficult to identify precisely. Spreaders trade on the temporal or geographical basis (price difference). That is, they may buy July wheat and sell December, or they may sell Chicago wheat and buy a similar contract in Kansas City. This apparent arbitrage activity accounted for 15 percent of total volume, and it is difficult to imagine these traders having a manipulative impact, since most of their activities were close to those of pure scalpers. Speculative scalpers maintained largely offsetting positions and were a relatively minor force in the market.

"Other" traders are member traders who bought or sold less than 100,000 bushels of the May contract.

#### METHODOLOGY AND RESULTS

The GFA study provides daily prices and data on transactions for each of the large classes of traders, but the tabular and graphical analysis employed could not link speculative behavior with price changes. Cross correlation techniques suggested by C. W. J. Granger (1969), and detailed in D. A. Pierce and L. D. Hough (1977), provide a mechanism for determining the association between trading activity and price.

Three variables are examined here for possible linkages to the change in price. The thrust of the USDA report was that large speculators "directly or indirectly" manipulated price, and so the first potential link is between changes in the trading position of largest speculators, who at some time during the period of study had an open interest of one million bushels or more, and the change in the price of the May contract. The second test includes all of the large speculators. The third test is for a link between brokerage-house change in open interest and price.

This cross correlation technique permits examination of interday relationships between trading activity and price. Unfortunately, if a link is found between trading today and price changes on later days, the test cannot distinguish between discounting and manipulation, although if no link is found, both can be rejected. Speculation causing immediate price fluctuations would be suggested though not proved by a positive correlation between same day price changes and trading activity, but for a price effect to be demonstrated it would be necessary but not sufficient to establish that large traders formed their positions prior to the price change.

Basically the procedure examines the cross correlations between two prewhitened series at various leads and lags.<sup>4</sup> Equation (1) gives the formal definition of this cross correlation:

$$\varrho_{xy}(k) = \frac{E(X_r Y_{rek})}{\sqrt{[E(X_r^2)E(Y_r^2)]}} \quad t = 1, 2, ..., n - k$$
(1)

A number of causal links may exist between two series. If  $\varrho_{xy}(k)\neq 0$  for some k>0, and zero elsewhere, then this implies that X causes Y. As an example, suppose X, is the change in the net long position of large speculators, and Y, is the change in the price at any time t. If  $\varrho_{xy}(5)$  was significantly positive, net increases in buying (long positions) today would cause the price to go up five days from now. If  $\varrho_{xy}(k)\neq 0$  for some k<0, and zero elsewhere, causality is reversed. Many other causal relationships potentially exist including feedback (non-zero correlations at both positive and negative lags), instantaneous causality ( $\varrho_{xy}(0)\neq 0$ ), and independence (no significant non-zero autocorrelations).

If one examines the autocorrelation structure of the change in prices, and the change in the net long positions of each of the three trading groups listed above, it appears that they exhibit the properties of a white noise process. This permits the examination of the cross correlations of two series directly without going through any further transformations (Chart 2).

The most noticeable feature is the prominent spikes in all three diagrams at lag zero(k = 0). For both groups of speculators, where the spike is positive, this implies that on days when these groups bought futures the price went up. It is important that causality not be read into the preceding sentence. It is impossible to determine whether price increases (or decreases) during the day caused purchases (or sales) by speculators or the converse. Intuition would suggest the latter, but to test this intuition would require similar time series data *within* the trading day. The results for the zero order correlations demonstrate apparent simultaneity.

A similar picture emerges for commission house trading except that here the within day correlation is negative. Assuming that commission house trading is representative of small speculators, then small speculators buy more when price is falling.

None of the correlations at other lags is significantly different from zero, rather convincing evidence that trades on any given day do not affect prices on other days, and vice versa.<sup>5</sup> If the general conclusions of the USDA report concerning

<sup>4</sup> A series is said to be whitened when it is transformed by a linear filter to a series that is "white noise" (a series that does not exhibit any form of autocorrelation). This is discussed in Box and Jenkins (1976). Pierce and Haugh (1977) demonstrate that this transformation when applied to both series in question preserves the causality between the series.

<sup>5</sup> Wider bands of lags were also examined and found to produce no significant correlations. The disadvantage of widening the lags under examination is that it consumes degrees of freedom and consequently reduces the level of confidence attached to any given correlation.





\* See text. Confidence limits formed through an application of a formula by Bartlett in G. E. P. Box and J. M. Jenkins (1976), *Time Series Analysis*, Holden Day, San Francisco, California.

an interday price effect were true, significant positive correlations should be seen at some positive lag (k>0) for at least the group of large speculators. This would be true if purchases of large speculators led to higher prices in the future, inducing a profit for these traders. The converse would be true for a sale today leading to lower prices in the future. The only evidence that is consistent with a speculative price effect is the relatively large (though not statistically significant) positive cross correlation at lag 2 for the largest traders. But this result is no more striking than any of the other individual correlations (e.g., k = -9 for the commission houses, and k = -5, -7 for the large speculators).

Looking beyond the 95 percent confidence interval an interesting picture emerges. As a group the correlations for negative lags (i.e., the effect of price on trading at future times) are largely negative for the two groups of large speculators and positive for the small speculators. If this relationship is significant, which is difficult to confirm statistically, it would imply that if the price went up today, large speculators would react by selling wheat over the next several trading days, while small speculators would buy. It is possible that large traders were selling out to take advantage of the price increase, while small speculators were trying to spot an incipient trend that may or may not have appeared.

For every seller of a futures contract there must be a buyer, and it appears (from the near mirror images of the correlations between large speculators and small) that traders working through the brokerage houses by and large took the reverse position of the large speculator. Given these correlations it is difficult to arrive at an interpretation which would lead to the average small speculator making money, and this is in agreement with the results of previous studies that examined the net outcomes of trades and discovered small traders to be remarkably unsuccessful. Blair Stewart (1949), working for the Commodity Exchange Authority of the USDA, examined the results of over 400,000 individual futures transactions from 1924 to 1932. Of the identified small speculators, 6.598 had net losses while only 2.184 had net gains. Possibly even more striking was the result that the net dollar losses for the losers were six times larger than the net gains of the winners. H. S. Houthakker (1957) and C. S. Rockwell (1967), respectively, examined this same question for 1938-51 (war years omitted), and 1947-65, and found that the abilities of the small speculators have not improved dramatically through time. The lagged correlation approach suggests the dynamics involved to explain why small amateur speculators lose out, on average, to the large professional traders.

Whatever conclusion one draws from these latter findings, there is still no evidence of the longer-term price effect of the trading of grain speculators alleged by the GFA. The GFA conclusion that excessive swings in prices within the trading day are caused by large trades cannot be tested adequately with these data, but the correlation analysis shows a link between the direction of trades and movements of prices.

#### IMPLICATIONS AND CONCLUSIONS

The wheat market's behavior in the spring of 1925 was violent and unpredictable, and it caused hardship for producers and consumers of wheat. Some journalists and many government officials firmly believed that large speculators had engineered the prolonged advance and the precipitous decline. This opinion was held by scholars in the area as well. J. S. Davis, K. Snodgrass, and A. E. Taylor writing in April 1925 gave their quarterly evaluation of the wheat market and noted two causes for the break in prices: the sale of futures on unhedged wheat from the Southern hemisphere, and the sale of May futures by (Davis et al., 1925, p. 149):

. . . professional speculators who believed the market was "overbought," also that the "longs" were financially overextended, and that therefore a selling campaign could be launched and prices driven down with the expectation of covering before the demoralized prices could be revived.

The support for the price-effect hypothesis seems to be the graphical inspection discussed earlier and the intuition of the various commentators. The belief that large traders caused excessive intraday variation was based on nonparametric tests and simple correlation analysis. By using Granger-style crosscorrelation analysis, the interday movements may be addressed directly, and the results offer no evidence of a price effect. The correlations between large speculator trading and price changes on the same day are essentially the same as those of the GFA study, but without intraday trading data it is impossible to suggest a causal relationship. Comparing the results for large speculators and commission houses brings to light an issue not considered by the original investigators. The dynamics among classes of traders has usually been considered in the light of trading results (i.e., small traders lose). The data from this study allow for a closer look at the mechanics of this process and appear to show a concrete relationship between large and small traders over several trading days.

If the hypothesis of a speculative impact on prices is not supported by the data, then an explanation of the volatile price behavior must be sought elsewhere. Davis and Taylor (1925) in their review of the 1924 crop year listed several events contributing to the movement of wheat prices. For three crops prior to 1924, supplies had been high and prices depressed. With short crops in 1924 in Canada and Europe, the world picture became quite clouded. The long price advance from May 1924 to January 1925 represented an adjustment from a surplus situation to one of potential shortfall. In G. W. Hoffman's words (1941, p. 16):

Looking back now it would appear that a fuller realization of the supply situation at the outset of the crop year 1924–25 would have placed prices somewhat higher.

In the last stages of the advance, it was European demand that maintained the inertia of the six-month increase in prices. Davis and Taylor wrote (1925, p. 39),

In retrospect it seems evident that these purchases had their major importance in strengthening the conviction that the wheat shortage was more acute than had been generally supposed, and than it actually proved.

It was in March that the most severe break in prices occurred. In addition to speculative causes, Davis and Taylor list the failure of European import and American milling demand to maintain their high levels, and the increased prospects for a good 1925 crop worldwide.

What seems to have happened here is that the meshing of information about supply and demand in the market connecting North America, Europe, Argentina, and Australia, was not perfect — as it never is. In times of market uncertainly errors are made even by well informed people. In January of 1925 the USDA stated its belief that the current price (near \$2.00) was justified by perceived supply and demand conditions. One cannot help notice the phrases "looking back" and "in retrospect" in the quotations from Hoffman, and Davis and Taylor. Unfortunately the determination of a market price is not formed by hindsight. As good information enters the market it corrects errors made earlier in an atmosphere of uncertainty, and it may correct them quickly as it did in March 1925. Such corrections are rarely, if ever, painless to all of the participants in a market, and it is all too easy after suffering an economic loss to look for the villain in the piece. In 1925 the public found its villains and conspirators in 1925 in the large speculators. The GFA scholars in the 1920s used the best tools at their disposal, and concluded that a speculative price effect played a significant role in the movement of the May 1925 wheat prices. A careful look at their results shows that such a conclusion cannot be supported. The reexamination performed here using more modern techniques fails to uncover any hidden evidence of price effect, and without a price effect there could have been no manipulation.

The economic analysis behind most regulation of the futures markets has generally been less careful than that performed by the GFA in 1925, and yet charges of manipulation, frequently leading to legislation, appear regularly. As noted above, the Commodity Exchange Act of 1936, which shifted the function of regulation of trading away from the exchanges and to the government, was passed in an attempt to rid the trade of disruptive forces. Futures trading in onions was halted by Congress when it was believed that excessive speculation, and in some cases manipulation, were the dominant factors in price movements. President Truman in 1947 called for higher margin requirements to check speculation and the post-war food inflation. This last attempt at expanding regulation failed, but in early 1980 Commodity Futures Trading Commission Chairman James M. Stone renewed the call for government control over margins.

Charges of manipulation and excessive speculation usually arise during periods of unusual market activity, but they should be subject to careful analysis before action is taken. This paper suggests techniques which may be applied to these and other similar situations.

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