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CHAPTER 3.

CONCENTRATION IN CASH AND FUTURES MARKETS

A second general area of concern about the current delivery provisions is the breadth and depth of the underlying spot market and hence the susceptibility of the market to manipulation. Beyond dispute, the cash markets for wheat, corn, and soybeans in both Toledo and Chicago are thin markets. As documented in the preceding chapter, aggregate receipts of all three commodities into both Chicago and Toledo have been generally declining over the last 25 years. And, although the addition of Toledo as a deliverable location in the 1970s enlarged deliverable supplies, the longer-term declines in receipts in Chicago and Toledo means the increase has been transitory. Indeed, deliveries are already larger on average than the available deliverable stocks by amounts that exceed the percentages that prevailed in the late 1960s and early 1970s before Toledo was added to any of the contracts.

Another indication of thinness of the underlying cash markets in both Chicago and Toledo is in the cash price reports themselves. The official USDA quotations are frequently only nominal prices, the average of reported bids that are posted each day. Thus, many of the prices do not represent actual transactions. To be sure, grain and soybeans do still move in and out of Chicago and Toledo. However, much of it is not actually purchased or sold over the scale in either location. (Cash transactions for the item in store are even less frequent.) In the absence of numerous transactions, it is difficult to know how much could be bought or sold at the posted prices or how rapidly they would change if transactions were sizable.

Thin markets are susceptible to manipulation and more so, the more concentrated are positions in them. It is important to be clear that thin markets are not by definition frequently manipulated. Rather, thinness simply indicates the comparative difficulty an individual faces in trading in quantity without a significant price effect. And, because of this possibility

of price effect, the potential for manipulation is greater in a thin market than in a broader, more liquid market. Similarly, a high level of concentration among positions is not a priori manipulation, but is only indicative of potential. With these admonitions stated, in this chapter the available evidence is examined on the extent of concentration first in the physical markets in the delivery locations and then in the futures markets as contracts approach expiration. Observed levels of concentration are high, and the last section looks for their possible effects on market prices. The analysis begins with consideration of the size of stocks relative to the available warehouse space.

UTILIZATION OF THE AVAILABLE DELIVERY SPACE

The data assembled in Figure 3.1 show the relation between stocks of wheat, corn, and soybeans together and the capacity of approved delivery warehouses in Chicago and then Toledo from December 1964 through September 1989. Total stocks are measured five times per year, on the first of each of the principal delivery months: March, May, July, September, and November/December.[1] The measure of stocks in Figure 3.1 also includes recorded CCC stocks held in Chicago and Toledo, but does not include stocks of other grains, such as barley or oats, which have occupied some space in these facilities from time to time. Finally, the capacity includes Toledo space as of July 1973 and, at that time, the measure of stocks was adjusted to include Toledo stocks of all three commodities even though corn and soybeans were not deliverable there until somewhat later.

As evident in Figure 3.1, total stocks have increased on average over the 25 years plotted there. Most of the increase results from the addition of Toledo stocks in the 1970s. Some portion, however, is attributable to CCC as well as FOR stocks, both of which tend to stay in place for some periods of time. Thus, the longer-term downward trends in receipts (or transactions more generally) are not inconsistent in principal with overall increases in stocks evident here.

More important, stocks of the three commodities together appear never to have exhausted the eligible warehouse capacity underlying the futures contracts, at least on the Friday nearest the first of the principal delivery months. Put differently, it would seem that space per se is not a binding constraint. Room for at least several million bushels of any particular commodity could have been found if there had been the demand for delivery.

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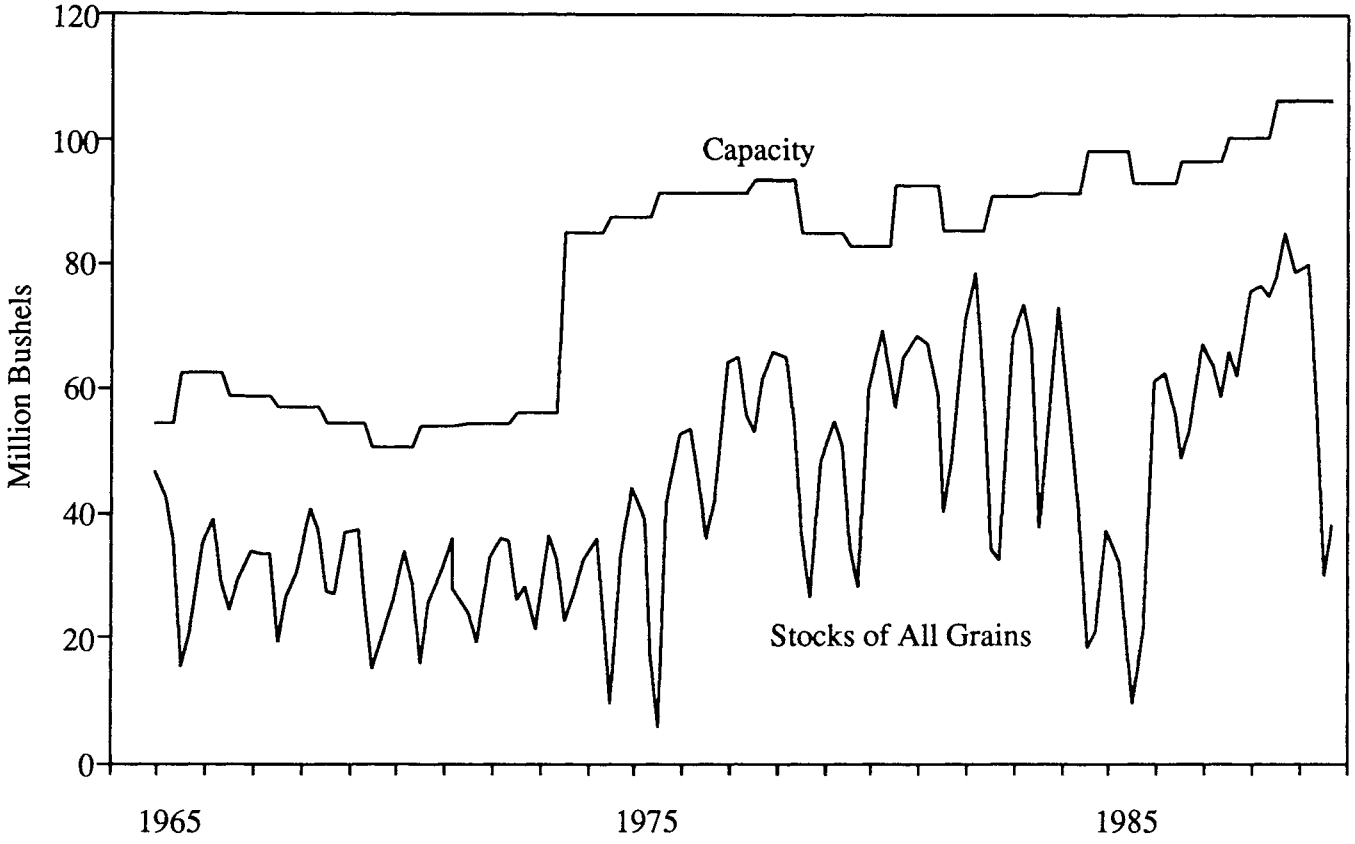
[1] The delivery months of January and August for soybeans are ignored in these series, and the stocks of soybeans as of the first Friday in November have been added to the stocks of corn and wheat as of the first Friday in December to create the fifth observation each year.

Figure 3.1—Stocks of Wheat, Corn, and Soybeans, Including Commodity Credit Corporation Stocks, in Registered Warehouses



At the same time, it is also clear that if it were desirable to increase the deliverable supply substantially, the space available in Chicago and Toledo would be inadequate. Moreover, the historical record also shows that space relative to deliverable stocks is currently at a ratio similar to that when the CBOT acted in the 1970s to add space by permitting Toledo deliveries. During the period before Toledo was added as a delivery location, total stocks filled some 54 percent of the eligible space on average, with a maximum of 86 percent in December 1964. Since November 1979, when Toledo was eligible to deliver all three commodities, the average has been 59 percent, with a maximum of 92 percent. To the extent that space was a constraint on the delivery capacity of the markets before the contract changes in the 1970s, it is a constraint now.

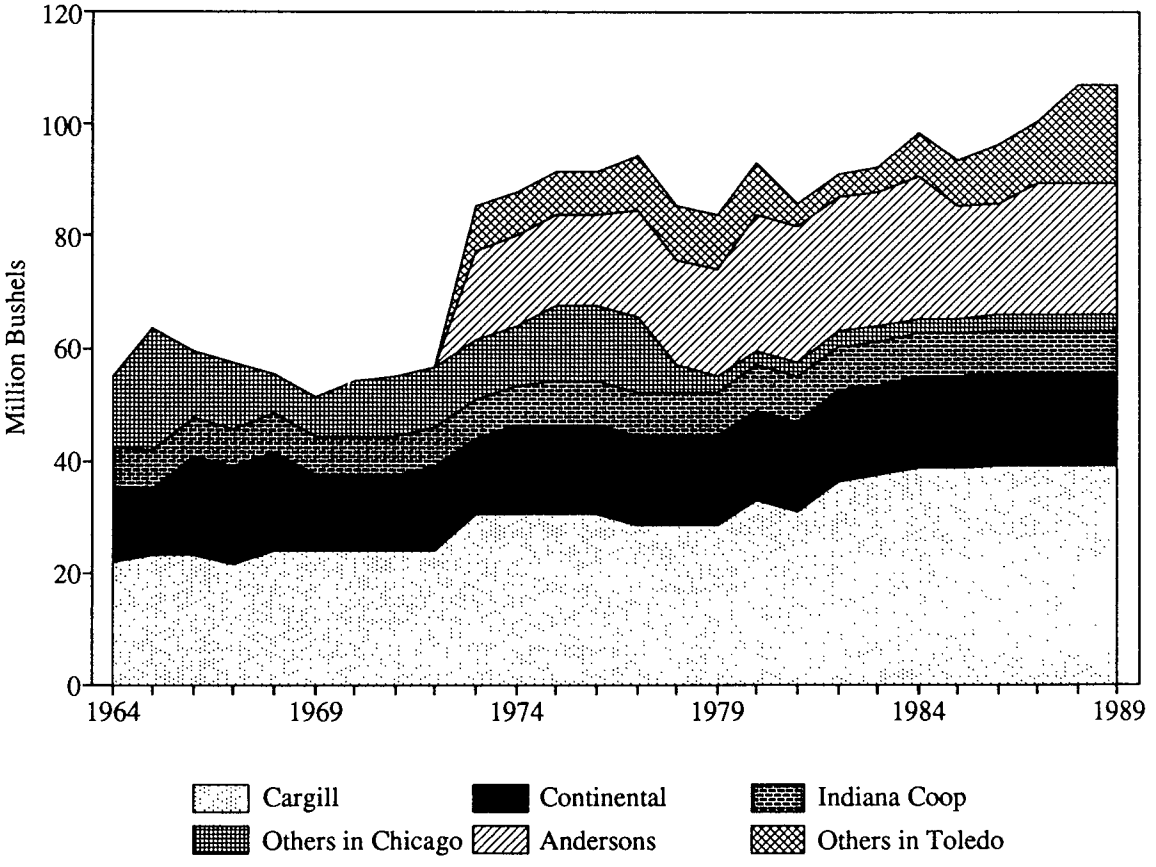
CONCENTRATION IN THE DELIVERY SPACE

One measure of the degree of competition in the futures delivery system is the number of potential participants. On the long side, the potential is large—almost anyone can hold a futures contract to expiration and thereby acquire warehouse receipts to stocks in eligible space. On the short side, however, deliveries are limited by available stocks in eligible space. To the extent that warehouse receipts for these stocks are traded and held by others than those elevators containing the stocks, there are a larger number of people (or firms) who are potential deliverers in any specific contract than simply the number of firms owning the eligible space. Similarly, elevators eligible to make delivery on CBOT contracts are to some extent public elevators, and an individual who wants to make delivery on a futures contract can call an eligible elevator, reserve space, pay the necessary fees, deliver the grain or soybeans and receive the warehouse receipt to give to the clearinghouse. No data indicate how frequently individuals make use of the delivery elevators in this way; anecdotal evidence suggests that it is infrequent. Thus, although the concentration among the owners of the deliverable warehouses may overstate the concentration among those able to deliver on any specific contract, that concentration is relevant for the longer term because only exchange-approved warehouses introduce into the system warehouse receipts eligible for delivery.

Figure 3.2 depicts the concentration in ownership of warehouse space eligible for delivery on CBOT wheat, corn, and soybean contracts from 1964 to 1989, based on data reported annually in the CBOT's "Letter to Members." From 1964 to 1973, eligible space averaged 56 million bushels, with the Cargill and Continental operations accounting for some 68 percent.[2] Other elevators in Chicago in this period included variously the Irondale

[2] These operations comprised several different facilities, including the three separate Continental elevators ("A," "B," and "D") and the Cargill elevator.

Figure 3.2—Ownership of Warehouse Space Eligible for Delivery on the Chicago Board of Trade Wheat, Corn, and Soybean Contracts



Elevator, the Garvey Elevator, the Gateway Elevator, the Calumet Elevator, the Rice Powell Elevator, and the Sante Fe Elevator. The inclusion of Toledo in 1973 added the considerable elevator space owned by the Andersons (some 16 million bushel capacity at the Maumee and Riverfront Elevators in 1973) and the 6.6 million bushel capacity of facilities owned by Cargill. Others in Toledo have included Michigan, Mid-States, and Peavey. Finally, the Cargill facility in Burns Harbor was added in 1982. From 1973 to 1989, the Andersons, Cargill, and Continental accounted for an average of 76 percent of the total eligible delivery space.

Clearly, ownership of the eligible space is highly concentrated. The addition of Toledo changed the balance somewhat, by introducing a third large firm. The two-firm concentration declined on average when facilities in Toledo were added from the 68 percent contract by Cargill and Continental to 59 percent on average by Cargill and the Andersons. But, a three-firm ratio in the post-Toledo period of 76 percent is still high by standards in most industries.

CONCENTRATION OF FUTURES POSITIONS

An additional perspective from which to consider the adequacy of the cash market underlying the CBOT contracts is provided by data on concentration in the futures positions themselves. In the delivery month, futures positions that remain open are essentially cash market positions---promises to accept and pay for deliveries and promises to supply the commodity. One issue, therefore, is the degree to which these positions appear to encumber the available supplies.

For this analysis of the issue, the CFTC made available data comprising the daily positions of the four largest longs and the four largest shorts in the expiring contract during (and just before) each of the delivery months for CBOT wheat, corn, and soybeans from 1982 through 1989. Although similar data are not available to help establish what levels of concentration were in earlier periods, the CFTC also provided data on the largest traders' positions in the Kansas City wheat and Comex copper markets. Unfortunately, the first three years of the data for these two markets proved unusable; but, comparisons are still possible with these series from 1985 through 1989.

The data on holdings in expiring contracts derive from the reports that traders with so-called large positions (in the CBOT contracts, larger than 500,000 bushels) make to the CFTC. Because of this minimum quantity for reporting, the number of reported positions will drop below four toward the end of the daily series for each contract. Thus, the concentration levels reported in this chapter are in some sense a minimum estimate of the positions of the principal longs and shorts. In almost all expirations, there

are (at least) four shorts and four longs with positions greater than 500,000 bushels early in the delivery month.

The day before the shorts can first give notice, namely the first position day, is an important day for the analysis because the deliveries that will occur on the first delivery day have not yet been removed from the open interest. To observe the changes in the degree of concentration to later in the delivery period, the tenth business day of each contract month was chosen. It is approximately the middle of the delivery month, with just three to four days of trading remaining on the expiring contract, but the remainder of the month to fulfill any delivery obligations. Finally, the four largest traders, long or short, on position day are not necessarily the same four largest traders remaining in the middle of the month or even the same on the next day. The data did not identify any firm's position over time. To assure confidentiality, all statistics presented here aggregate the data for the top four traders and do not identify individual contract months. Because the entire sample is relatively short and because inspection of the data from 1987/88 and 1988/89 indicated they were not obviously different, no subperiods are broken out in the statistics reported below.

The entries in Table 3.1 summarize the average levels of concentration represented by the four largest traders in each expiration month for the five commodities. The aggregate absolute positions are reported as are the positions relative to both the open interest and deliverable supplies. As an example of the underlying series, Figure 3.3 presents the frequency distribution of the aggregate concentration levels from the soybean market. It shows the number of contract expirations that the positions of the four largest longs (top panel) and four largest shorts (bottom panel) were of the indicated size as of the first position day. For example, in only one delivery month in the entire 1982–89 period was the aggregate position of the four largest longs 2.5–5 million bushels of soybeans; whereas, in nine expirations, the aggregate shorts' position was 0–2.5 million bushels. The distributions show the levels of concentration are quite variable from expiration to expiration and that isolating any as obviously small or unusually large is difficult. Although not shown, the frequency distributions from the other markets are similar. Also in Figure 3.3, the contract expirations from 1987/88 and 1988/89 are highlighted to show they are indistinguishable in level and distribution from those of the longer series.

The summary statistics in Table 3.1 show that the typical aggregate positions of the top four largest traders are surprisingly large, for both the longs and the shorts. For example, as of the first position day, the positions of the four largest longs averaged some 13.1 million bushels over the 39 wheat contract expirations in the sample. Average aggregate positions were larger in both soybeans and corn. With deliveries about to begin, these positions represented sizable calls on the available deliverable stocks,

Table 3.1—Average Concentration of the Four Largest Long and Short Futures Positions

	CBOT wheat, 1982–89	CBOT corn, 1982–89	CBOT soybeans, 1982–89[a]	KCBOT wheat 1985–89	Comex copper, 1985–89[b]
Four largest futures longs on position day					
Aggregate position (million bu)	13.1	37.5	16.8	10.0	102.3[c]
Percent of open interest	39	34	30	59	40
Percent of deliverable stocks	377	446	224	93	168
Four largest futures shorts on position day					
Aggregate positions (million bu)	12.1	26.5	19.5	7.6	94.6[c]
Percent of open interest	36	25	33	44	37
Percent of deliverable stocks	319	237	235	70	129
Four largest futures longs midway through the delivery period					
Aggregate positions (million bu)	3.2	11.2	5.5	0.9	32.1[c]
Percent of open interest	59	62	57	48	48
Percent of deliverable supply	132	131	90	9	76
Four largest futures shorts midway through the delivery period					
Aggregate positions (million bu)	1.7	5.4	3.2	0.5	20.3[c]
Percent of open interest	27	31	32	18	26
Percent of deliverable supply	93	67	54	5	51

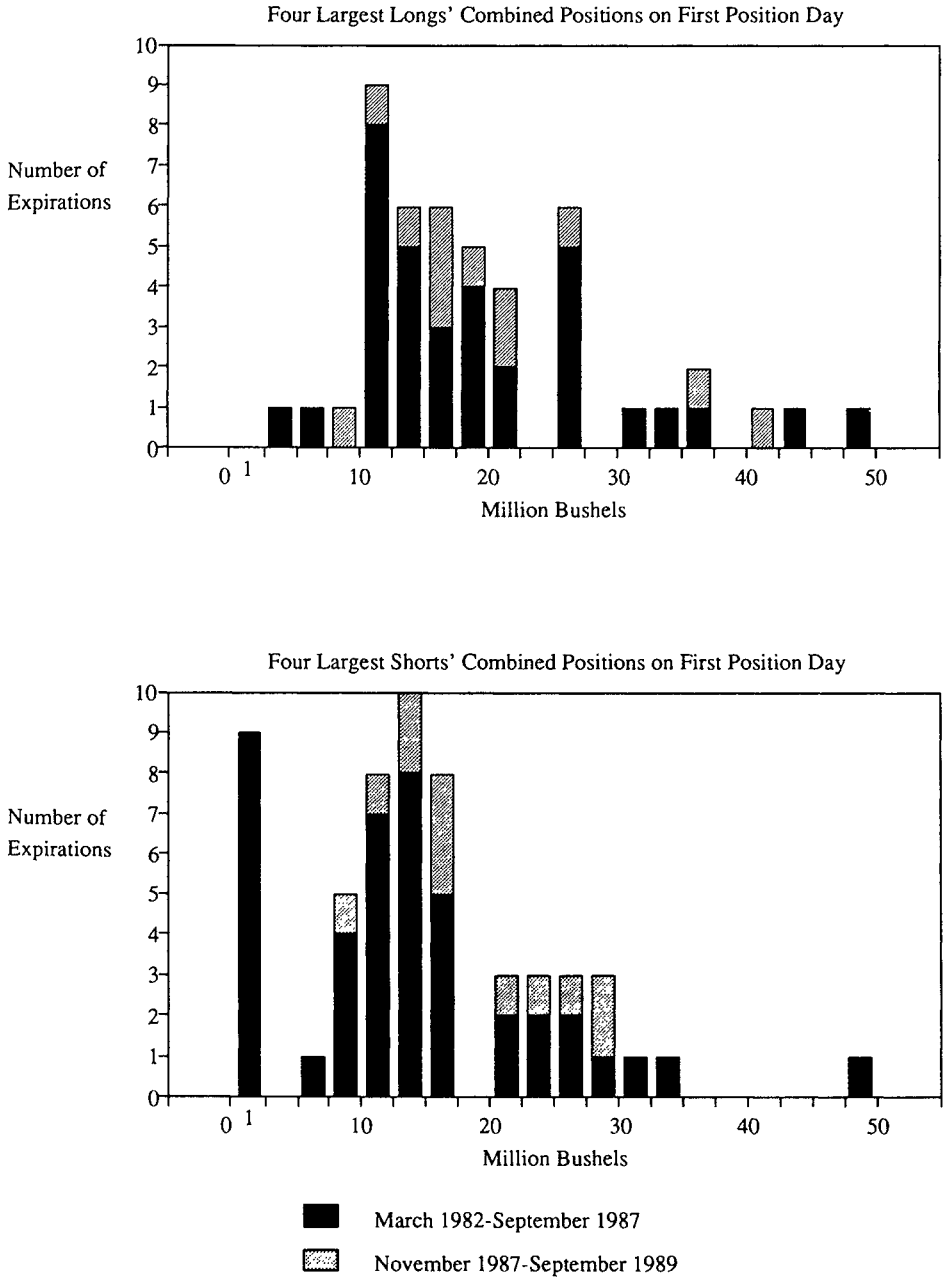
Source: Position data were provided by the Commodity Futures Trading Commission. Open interest and stocks data are from the indicated exchange, their statistical annual, or the CFTC.

[a]Data for January contracts were missing.

[b]Data exclude December 1988.

[c]In million pounds.

Figure 3.3 Size of the Four Largest Long and the Four Largest Short Futures Positions in the Expiring Soybean Contracts, 1982 89



more than 200 percent of the available stocks of soybeans on average, almost 400 percent of the available stocks of wheat and more than 400 percent of the stocks of corn.

For their part, the shorts had nearly as large commitments to deliver from the available stocks at the beginning of the average delivery month. The aggregate position of the four largest shorts averaged 12.1 million bushels of wheat, which amounted to more than three times the available stock. The comparable averages represented 26.5 million bushels of corn and 19.5 million bushels of soybeans, both also more than double the stocks in the deliverable locations. And, as the distribution of the concentration figures from the soybean market showed, the positions of the top four shorts and the top four longs are not only large on average, they are also highly variable. An aggregate position of twice the average is not unusual nor is an aggregate position less than half the average rare.

The comparisons of the large futures positions with the available stocks is not meant to suggest that all (large) positions entering the delivery month will in fact make or take delivery. Some will simply be closed, with perhaps a new position established in a more distant maturity. Other positions will be settled with exchanges of futures for physicals. Nevertheless, these transactions have not taken place as of the beginning of the delivery period, and short of interviewing them, it is impossible to know traders' intentions. And, with concentrations as high as percentages of deliverable supplies as the data indicate, it is quite likely that the exchange and the CFTC have had to increase their monitoring activities substantially.

By the middle of the delivery month, concentrations have typically declined, both relatively and absolutely. For example, the positions of the four largest longs in wheat futures represent a call on only 3.2 million bushels on average, down significantly from the 13.1 million at the beginning of the month. Still, these positions continue to be greater on average than was the deliverable stock at the beginning of the month. With at most three or four days of trading in the contract remaining, they are rather larger than might have been expected. Similarly, the four largest remaining shorts are still committed to deliver nearly the entire stock on average. And, in most months, the delivery data show those stocks would already have been delivered at least once.

Another comparison in Table 3.1 is the combined holdings of the largest four traders as percentages of the open interest. Of course, nothing limits the "supply" of open interest in futures contracts, as opposed to the physical availability of the commodity in a specific location. And by the nature of futures contracts, the last remaining short and long have 100 percent of the open interest on each side of the market. Nevertheless, the concentration in the open interest, say, on the first position day, may indicate how liquid the futures market might be should an individual trader want to trade out

of a position in the expiring contract. Presumably, the potential for a price effect would be larger if that trader's position represented a large percentage of the open interest (and possibly that potential for a price effect might also inhibit the trader from closing out the position in as timely a manner as otherwise).

Although the complete distributions of these ratios involving open interest are not displayed here, they are quite symmetric and quite diffuse. The average concentration in terms of the open interest, especially by the tenth business day and especially among the longs, is often very high. The suggestion is strong, therefore, that these concentration percentages must be interpreted carefully in regard to futures markets, because no one has asserted that these three CBOT markets or any other futures market have been manipulated nearly continuously throughout the 1980s.

Interestingly, the concentration among the four largest longs in terms of the open interest typically increases during the delivery month, whereas there is no such increase in concentration among the shorts. In wheat, the average percentage of open interest held by the four largest longs increases, from 39 to 59 percent from first position day to the tenth business day. For corn, it is from 34 to 62 percent, and for soybeans, from 30 to 57 percent. This increase is true for most individual contracts as well, not just the averages. In other contexts and for particular contracts, similar increases in concentration among positions have been taken as exceptional and as an indication of congestion.[3] Instead, they appear to be the norm, at least for the CBOT markets in the 1980s.

The comparable data from the CFTC on positions for Kansas City wheat and Comex copper futures expirations are also summarized in Table 3.1. Again, they provide some interesting comparisons. Most obvious, the seemingly high concentrations of the four largest positions relative to the open interest at the beginning of the month are also the norm in Kansas City wheat and Comex copper. Thus, the suggestion is even stronger that high levels of concentration, at least compared to all traders with futures positions, are typical as contracts move into expiration.

The data from the Kansas City wheat market and from the copper market provide two contrasts with the CBOT data, however. Most important, the four largest positions, long and short, in Kansas City wheat and Comex copper are much smaller percentages of the deliverable stocks as the

[3] For example, to justify terminating trading in the CBOT's March 1979 wheat contract, the CFTC noted the increase during March in the percent of the open interest controlled by four large traders as one concern. As of mid-March, the positions were some 81 percent of the open interest which, while greater than the average of 59 percent reported later in Table 3.3, is not out of line for the entire distribution where 10 of the 39 expirations had concentration levels greater than 75 percent. See Gray and Peck (1981) for more detail on the CFTC's concerns.

delivery month begins. Second, the size of the four largest long positions declines about as rapidly as the open interest in these two markets so that there is not the pronounced increase in concentration among the longs just before the end of trading.

Taken together, the evidence points again to concern about the adequacy of the deliverable stocks of wheat, corn, and soybeans. The statistics on amount and ownership of available space on the one hand and of futures positions on the other reveal that high degrees of concentration are common as futures contracts expire, both for the three CBOT contracts but also for the other contracts examined here (where comparable data were available). Where the three CBOT contracts do differ is in the higher degree of concentration of large futures traders relative to the deliverable stocks. The deliverable stocks are again pivotal, precisely because they link the cash and futures markets. Such high concentration levels relative to the stocks undoubtedly have increased regulatory monitoring of the contracts, which is itself an important increased cost. Nevertheless, the concentration might be less of a concern if it did not also affect prices. The next section explores possible price effects.

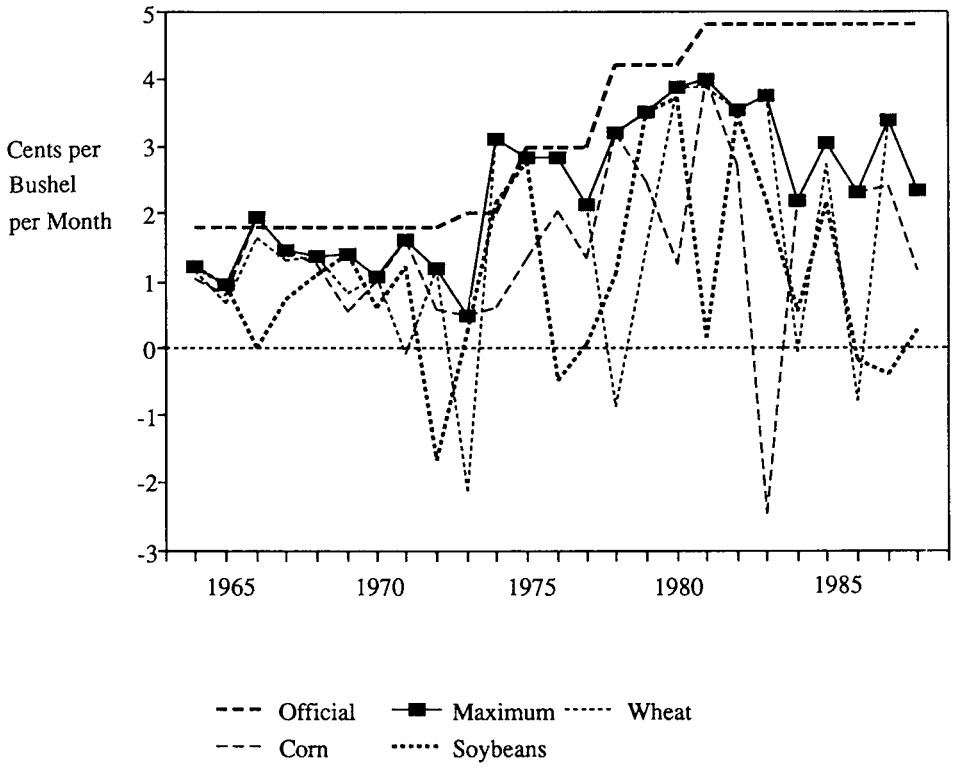
PRICE EFFECTS OF THE HIGH LEVELS OF CONCENTRATION RELATIVE TO DELIVERABLE STOCKS

The difference in price between the expiring futures contract and the next nearby futures indicates the return to continued storage and is the obvious price difference to examine first for possible effects of concentration.[4] Firms with short positions in the expiring futures held against stocks must decide whether to deliver, to sell the stocks and offset the futures position, or to continue holding the stocks but move the futures position into another contract. Similarly, longs must decide whether to stand for delivery, to purchase their requirements elsewhere and close out their futures position, or to roll over their expiring futures position for one in a more distant delivery. Both shorts and longs might also exchange their futures against positions in the cash markets. These decisions will be affected by and possibly will affect the price difference between the expiring and next nearby futures.

Figure 3.4 provides a view of the changes in these spreads over the entire 1964–89 period. In it are plotted the maximum for each commodity during each cropyear of the interest-cost-adjusted (see below for details) spreads between the expiring and next nearby future. That is, for each commodity, the largest spread each cropyear is selected from those observed on the first of the five principal delivery months identified earlier. It

[4] The price difference was termed the price of storage by Working (1949), where he presented evidence about its relation to storage decisions.

Figure 3.4—Maximum Interest-Adjusted Price Spreads Compared to Official Storage Costs, 1964–89



then is the maximum for that cropyear that is plotted in the figure. The heavy solid line plots the largest of the individual commodity maximums each year,[5] and the heavy dashed line plots the exchange-approved costs of storage in the eligible warehouses. Figure 3.4 shows how variable the maximum spreads, and hence maximum returns to storage, have been both over cropyears and among the three commodities competing for the same storage space. They have been much more variable than have been offi-

[5] The largest spread each period has been called the price of binspace because it represents the maximum return that an owner of warehouse space might expect given the separate returns for each commodity. See Paul (1970).

cial costs and, in the more recent years 1980–89, they have clearly been declining on average.[6]

The other interesting aspect of the data in Figure 3.4 is the evident difference in the post-1980 period between the maximum spreads (which are net of interest costs) during the cropyear and the official fees for storage. In part, the difference is larger than has been the case historically because the prime interest rate, which was used to adjust the spreads for interest costs, is higher than the rate at which most large firms would be borrowing during this period. Therefore, the interest adjustments were also made with the 90-day Eurodollar rate because it is a plausible lower bound to corporate borrowing costs. Use of these rates increased the net spreads in Figure 3.4 by less than 1 cent (per bushel per month) and did not affect the statistical significance of the overall pattern of decline in the spreads during the period. Thus, although the visual impression in Figure 3.4 of an historically large difference between the official fee for storage and the price spreads may overstate the difference, it is still true that the fee has been greater than the maximum returns throughout the 1980s by more than was true in the past. Such a difference may have been a discouragement to firms other than those owning the eligible delivery space to bring or keep stocks in the delivery locations, thereby helping to limit those who actually delivered on the contracts to the owners of the delivery space.

The data in Table 3.2 report the average changes in the price spread between the two future contracts in each market during the delivery month. It is the nearby spread, the difference between the price of the expiring future and the next nearby future, net of interest costs and adjusted for the time between the two options.[7] The change is measured from the first day of the delivery month to the next-to-the-last trading day.[8] A positive change indicates the spread is widening (the nearby future trading at a greater premium to the expiring contract). A negative change indicates a decline in the spread during the month. Two periods are identified. The first is from December 1964 through September 1979 when Toledo was finally

[6] The decline in the annual maximum spread in the soybean market from the 1979/80 through 1988/89 cropyear was statistically significant, amounting to nearly 1/2 cent per bushel per year. The decline in the overall maximum was also significant, amounting to 1/4 cent per bushel per year.

[7] Chapter 4 discusses the need to adjust the spread both for the calendar difference and for the timing of deliveries within each month. Interest costs are measured by the prime rate throughout for consistency. Adjustments were also made using 90-day Eurodollar rates for the 1979–89 period, but they do not affect the comparative changes reported in Table 3.2.

[8] The next-to-the-last trading day was selected to assure synchronous price quotations for the two futures. On the last trading day, trading in the expiring future (only) ceases at noon.

Table 3.2—Changes in the Price Spreads in Wheat, Corn, and Soybean Futures from the First to the End of the Delivery Month (*Cents per bushel*)

	Mean	Largest decline	Largest increase
Wheat			
July 1964–May 1979	−0.03	−5.91	9.28
July 1979–Sept. 1989	−1.52	−21.81	4.27
Corn			
Dec. 1964–Sept. 1979	−0.79	−4.99	4.01
Dec. 1979–Sept. 1989	−1.66	−10.35	3.26
Soybeans			
Nov. 1964–Sept. 1979	−0.01	−9.16	17.54
Nov. 1979–Sept. 1989	−3.29	−19.09	8.16

Source: Based on data provided by the Chicago Board of Trade or available in their *Statistical Annual.* Entries are the change in the adjusted spread between the expiring and next nearby contract from the first to the next-to-last trading day in the expiring contract's delivery month. The spreads are in cents per bushel per month, interest cost has been subtracted, and the time between delivery months in these calculations is adjusted for the expected timing of deliveries.

deliverable for all three commodities. Coincidentally, it is approximately the time when the official cost of storage was increased to its present level of 16/100 cents per bushel per day (or 4.8 cents per bushel per month). The second period encompasses the deliveries from November (December) 1979 through September 1989.

The average changes in spreads reported in Table 3.2 are all negative as might be expected because the calculation of the spread change did not take into account the effect (in some months) of the decline in time (and hence interest and storage charges) between the two futures from the first to the next to the last trading day. The reason for not including this effect in the calculation is precisely its variability—the decline is expected only when the expiring future is effectively the cash price as it is when the expiring contract is an early delivery contract. If deliveries do not occur until late in the month, the expiring future is not equivalent to a cash price even in the delivery month and so no such narrowing of the spread is expected.[9] Thus, the expected sign of the change in the spread is negative, the sum of months with no expected change and those with a small expected decrease.

What is most interesting in the average changes reported in Table 3.2 is

[9] Chapter 4 discusses the timing of deliveries within the delivery month in detail.

the contrasting amount of average decline in the spreads in the two periods. In the pre-1980 period, the average change was negative but virtually zero. In the post-1980 era, however, the decline each month is appreciably larger on average. The range of changes for each commodity also shifted, with the largest increase in the second period smaller than in the first and the largest decline bigger.[10]

The results in Table 3.2 are consistent with relatively more congestion and less liquidity in the expiring contracts in recent years being associated with the high levels of concentration noted earlier. The high concentrations in futures positions at the start of the delivery month show that large positions are regularly taken into the delivery month. With the positions of the four largest shorts multiples of the deliverable supply, not even the positions of these four traders can be settled by delivery and thus, for many, delivery is not a realistic option. Large deliveries (or the threat of large deliveries) would effect the expiring futures price (but not that of the next nearby future) thereby widening (or threatening to widen) the difference between them. Insufficient deliveries (or the lack of a threat of sufficient deliveries) mean more of the short positions in the expiring future must be offset, thereby having a tendency to narrow the price difference between the two futures during the month as seen in each market in the 1980–89 period. Moreover, the longs are aware of the dilemma the shorts in aggregate face and can therefore wait until they must trade.

A direct test of the association between concentration and price effects is possible for the somewhat more limited period of 1982–89 for which there are concentration data. Specifically, the change in the spread during the delivery month is regressed against the net concentration in the futures positions relative to deliverable stocks at the start of the month.[11] Each delivery month (e.g., March, May) was also permitted to have a separate

[10] The figures on the largest declines—−21.8 cents in wheat, −10.35 cents in corn, and −19.09 cents in soybeans in the recent period—are largely, but not entirely, from the last contract each cropyear, i.e., are changes in an old crop/new crop spread. If this last spread each cropyear is deleted from the data, the maximum decline in a wheat spread is −6.89 cents, but those in soybeans and corn remain unchanged. Deleting each of the old crop/new crop spreads from the series also has some effect on the averages reported in the first column in Table 3.2. The average declines in wheat and soybean spreads are reduced to only −1 cent per bushel in wheat and −1.6 cents in soybean. The average decline in the corn spread increases, however, to some −1.73 cents per bushel. Thus, neither the average nor the range of declines reported in the table are due to including the old crop/new crop spreads in the calculations.

[11] The level of concentration among the largest longs is generally highly correlated with that among the largest shorts from expiration to expiration causing multicolinearity problems if the variables are included separately.

Table 3.3 The Effects of Concentration in Futures Positions on the Change in Price Spreads During the Delivery Month, Wheat, Corn, and Soybeans, March 1982–September 1989

Variables	Wheat	Corn	Soybeans
Overall intercept	−0.774	−0.940	−0.876
	(−1.29)	(−2.15)	(−1.01)
Additional effect in:	May	July	July
	−0.629	−2.639	−6.487
	(−0.42)	(−2.52)	(−3.55)
Net long concentration	−0.003	−0.002	0.012
	(−1.67)	(−2.86)	(2.20)
Additional effect in:	May	July	September
	−0.038	−0.001	−0.032
	(−3.77)	(−0.27)	(−2.40)
R^2	0.438	0.356	0.363

Source: Futures positions data were provided by the Commodity Futures Trading Commission, and deliverable stocks and prices were provided by the Chicago Board of Trade or were available in their *Statistical Annuals*. Price spreads are net of interest costs and adjusted for timing of deliveries. Entries in the table are from ordinary least squares regressions, and figures in parentheses are t-statistics.

effect both on the average change and on the relation with concentration. In each case, only one month had significantly different effects on either the average or the relation and the results in Table 3.3 are from regressions that include a shifter for that month. The month is identified in the table as are the separate effects and their degree of significance.

The results in Table 3.3 show that the concentration of positions among the four largest traders relative to the deliverable stocks at the beginning of the delivery month has been significantly associated with subsequent changes in the spread during the delivery month.[12] In both wheat and corn, the association is negative overall, and most pronounced in the May and

[12] Similar tests were also made with the rather more limited data from the Kansas City wheat and the Comex copper markets. In both, the average (interest-adjusted) spread change was negative but virtually zero. In KCBOT wheat, there was no sign of association between changes in spreads and the degree of concentration relative to stocks. In copper, changes in spreads were associated with the degree of long and short concentration relative to stocks separately, but were not related to the net degree of concentration.

July futures, respectively. In soybeans, the association is positive overall, but most pronounced and net negative in September. Thus, the levels of concentration in futures positions relative to the available deliverable stocks in the wheat, corn, and to a lesser extent the soybean market are affecting prices during the delivery month. Generally, months with higher levels of net concentration at the beginning of the month are also those with a greater decline in the spread. The levels of concentration are measured relative to the deliverable stocks; hence, the higher the level of net long concentration, the more are the shorts required to simply trade out of their positions. Such trading in lieu of delivery (and without a threat to delivery) typically causes the spread between the expiring and the next nearby future to decline during the declining month.

CONCLUSIONS

In delivery months, the levels of concentration in futures markets as diverse as CBOT wheat, corn, and soybeans, KCBOT wheat, and Comex copper are higher than widely known, with the four largest positions on both sides of the market regularly accounting for 30 to 50 percent of the open interest remaining at the beginning of the month. The CBOT markets are different, however, because these levels of concentration in futures positions translate to multiples of the available deliverable stocks, not fractions. Ownership of the deliverable space is also highly concentrated for the three CBOT commodities, and although it has been highly concentrated for virtually the entire 25-year period analyzed here, the evidence suggests that recently there has been relatively less incentive for others to participate in the delivery system because the official fees for storage in these facilities have been at levels much greater than market returns.

A high level of concentration relative to the available stocks is, of course, always a regulatory concern because of the threat posed to orderly trading in markets. Undoubtedly, the CBOT markets have attracted significant monitoring both by the exchange and by the CFTC because of their high levels of concentration. These levels of concentration would be less worrisome, if there were no evidence that they were having significant effects on contract pricing. Unfortunately, that is not the case. Evidence in the chapter showed the price differences between the expiring and the next nearby future were regularly declining during the delivery months by substantially more than they had in the 1960s and 1970s. Moreover, the amount of the decline in a particular month was significantly associated with the level of net concentration relative to stocks. The higher the net concentration, the greater the decline in the spread. The effects were strongest in the wheat and corn markets, where concentrations among the four largest traders have been regularly 300 to 400 percent of the deliverable

supplies. The effects were not as consistent in soybeans, but in at least one month each cropyear the same negative relation between spread changes and concentration was noted. Perhaps the overall relation in soybeans differed because concentration levels have been averaging "only" some 200 percent of the deliverable supply. Together, the evidence in this and the previous chapter points to markets increasingly jeopardized by a paucity of deliverable supplies.