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DELIVERIES ON CHICAGO BOARD OF TRADE
WHEAT, CORN, AND SOYBEAN
FUTURES CONTRACTS, 1964/65–1988/89 †

CHAPTER 1.

INTRODUCTION

In July 1989, the Chicago Board of Trade (CBOT), with the support of the Commodity Futures Trading Commission (CFTC), ordered a firm to reduce its large position in the then-expiring July soybean futures contract on a fixed daily schedule. The action, although taken in response to a possible squeeze in that one expiring contract, served to underscore a long-standing concern of numerous participants, namely, that contract expirations in the

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three principal agricultural futures markets at the CBOT—corn and wheat as well as soybeans—were perhaps not occurring as smoothly as might be desired.

CONCERNS ABOUT DELIVERIES OF WHEAT, CORN, AND SOYBEANS

Concerns about contract expirations have been expressed in many ways over the last two decades. The CFTC, for one, declared that an emergency existed in the expiration of the March 1979 wheat futures contract, and it tried to close trading in that contract early. Earlier in the 1970s, CBOT committees' reviews of contract performance led to important expansions in the settlement terms for each commodity, adding Toledo (and St. Louis, in the case of corn) as a possible location for deliveries, thereby expanding certified delivery space by more than 50 percent. In 1974, the CBOT also experimented with a U.S. Gulf delivery wheat contract, providing settlement terms entirely outside of Chicago. More recently, the Warehouse, Weighing, and Custodian Committee at the CBOT adopted a series of rule changes to tighten the conditions under which facilities could remain regular for delivery. In 1988, the Feed Grain, Wheat, and Soybean Committees each requested and received studies of the performance of these contracts by the Economic Analysis and Planning Department.¹ The *Studies* themselves drew no formal conclusions. The results in the *Studies*, however, "indicated that, in general, the CBOT...futures market has performed well as a pricing and hedging medium for the 1987 crop year as compared to other years" (Volume I of each of the CBOT's *Studies*, Executive Summary, p. 1). At the same time, each *Study* suggested "that locational delivery differentials and price limit regulations should be considered to determine if the performance of the...futures contract could be improved" (Ibid.). Since then, the exchange and the CFTC have been discussing several possible changes in contract specifications, including changes in the discounts for delivery at non-par locations, possible changes in specific months for trading, the addition of more delivery space, and changes in the discounts and premia for the various non-par grades. In addition, the CBOT commissioned a study by the Mid-America Policy Institute (1991) of many of these issues and Congress asked the U.S. Government Accounting Office (1991) to report on the adequacy of the present delivery system.

In addition, market participants have expressed worries about market performance. Specific worries have varied over time and among the mar-

¹ The three studies prepared by the Economic Analysis and Planning Department at the CBOT are the *1988 Wheat Study*, the *1988 Corn Study*, and the *1988 Soybean Study*. Each is in two volumes: Volume I contains most of the data and analysis, and Volume II contains basis plots.

kets, but have included possible declines in hedging effectiveness, increasing illiquidity in the cash and futures markets during the delivery period, the persistence of perplexing, allegedly uneconomic price relationships, and occasional accusations of manipulation. All these concerns suggested that a thorough analysis of the performance of the delivery system was necessary and provided the principal motivation for this study.

Deliveries are widely thought to be insignificant relative to the number of contracts traded, no more than 1 to 2 percent. Indeed, the accepted wisdom is that sizable deliveries are indications of problems in the market. Hieronymus put it most directly: "In markets that work, delivery is rarely made and taken; futures contracts are entered into for reasons other than exchange of title. Markets where there is a large amount of delivery fail... because extensive delivery is an indication of an out of balance contract, one that favors either the longs or the shorts" (Hieronymus, 1977, p. 340).

Although Hieronymus does not define large or extensive, the considerable variation among recent levels of deliveries in wheat, corn, and soybeans suggests there is no obvious standard. Over the five delivery months in the 1988/89 cropyear, wheat deliveries averaged 17 million bushels each expiration, some 13 percent of the maximum open interest in each contract and nearly 60 percent of the open interest remaining when deliveries began. For corn, deliveries averaged 16 million bushels in each delivery during this same cropyear, representing an average of 3 percent of the peak open interest and 13 percent of the open interest at the start of the delivery period. And, for the 7 delivery months over the 1988/89 soybean cropyear, 16 million bushels were delivered on average, representing 6 percent of maximum open interest and 23 percent of initial delivery period open interest. Moreover, each month's deliveries represented an average of 284 percent of the deliverable stocks of wheat, 83 percent of stocks of corn, and 52 percent of stocks of soybeans. Do any of these deliveries represent extensive deliveries and markets threatened with failure?

Surprisingly, little published evidence indicates what levels of deliveries might be considered normal, or whether differences exist in these levels among markets, or even whether large deliveries are characteristic of markets with problems.² As a consequence, there are virtually no accepted criteria against which to assess the performance of either a specific contract expiration or of expirations in one market versus those in another. That is, although most would agree with Hieronymus's overall assessment, that assessment does not indicate whether deliveries averaging some 60 percent

² The principal exceptions are studies of specific markets when they are perceived to be (or to have been) in trouble. See, for example, Paul, Kahl, and Tomek (1981), which examined the delivery problems in the Maine potato market, or Gray and Peck (1981), which evaluated the rationale for the CFTC's emergency action in the March 1979 CBOT wheat contract.

of the open contracts at the beginning of the delivery month, representing some 284 percent of available deliverable stocks as the case in the wheat market, should be a cause for worry.

Nor are the delivery levels themselves the only concern. Once Toledo was added as an alternate delivery location in the 1970s, the amount of warehouse space from which deliveries may occur has changed little. Over the 1980s, eligible space for wheat, corn, and soybean deliveries (excluding St. Louis) has been about 100 million bushels. Combined stocks of wheat, corn, and soybeans have filled more than 80 million bushels of this space at the beginning of some delivery months and, as a consequence, there were times when merchants could not have increased significantly the amount of stocks that could have been delivered. Concentration in ownership of eligible space has also been an issue. Of the approximately 100 million bushels of space in Toledo and Chicago, two firms own some 60 percent and four firms over 90 percent.

As the revisions of the 1970s demonstrate, concerns about the adequacy of the contracts' delivery specifications are not new. The corn and wheat contracts, for example, date to the origin of the CBOT itself in the mid-nineteenth century. Chicago was then one of the principal grain trading centers in the United States and the specific delivery terms, emphasizing delivery in store, emerged quite naturally from common trading practices of the day. Chicago has long since declined as a center for cash grain trading, a decline reflected not only in statistics of grain movements but also in those of prices. Official U.S. Department of Agriculture (USDA) prices for wheat, corn, and soybeans in Chicago are processors' bid prices and have become largely nominal quotations, with few actual transactions reported. The general decline of Chicago as a merchant center led to the addition of Toledo as a delivery location, although not until the 1970s. In 1973, Toledo became an alternate delivery location for the wheat contract (deliveries there at a 2 cent per bushel discount). In 1976, Toledo and St. Louis were added as alternative locations for the corn contract (at a 4 cent discount) and, in 1979, Toledo was finally added as an alternative for soybean deliveries (at an 8 cent discount).³ The discounts have not been changed since they were first established.

³ As described in Chapter 4, the addition of St. Louis as an alternative location for corn deliveries has had little practical effect. There have, for example, been no corn deliveries in St. Louis since 1981. Thus, virtually all the data assembled for the analyses in this report do not include the St. Louis alternative.

THE PLAN OF THE STUDY

The present study examines the performance of the principal aspects of the delivery system on the CBOT wheat, corn, and soybean futures markets. Chapter 2 assembles the available evidence about the amount of deliveries and their relation to levels of both futures trading and deliverable stocks for those three markets and also for wheat in Kansas City and copper. For wheat, corn, and soybeans, the representativeness of the delivery markets is then analyzed by considering the representativeness of the deliverable stocks to primary movements of each commodity. Crop production statistics from Illinois, Indiana, and Ohio and compilations of export originations from Great Lakes ports provide some background information as well. The purpose is to describe the importance and representativeness of the CBOT deliveries and to document changes, if any, in the last 25 years.

Chapter 3 assembles information on the concentration of positions in both the cash and futures markets, again comparing the recent experience in the CBOT markets both to historical levels when possible and to other markets. The focus is on assessing the depth and liquidity of the markets at the time of delivery. The price differences between the expiring and the next nearby future play a key role in delivery decisions and are examined carefully for the inducement they provide for continued storage and for evidence of the effects of congestion, if any, in trading during the delivery months.

The economic determinants of deliveries from deliverable stocks are described in Chapter 4, and the specific determinants of the value of the shorts' options as to location and timing of deliveries are analyzed. In particular, economic relations describing the specific timing and location of deliveries are presented and their results used to assess the degree to which prices in delivery locations may be seen to have affected the relative amounts delivered.

Chapter 5 assesses evidence about hedging effectiveness, first of basis convergence at the delivery locations and then of usefulness of the markets at several non-delivery locations. Again, the focus is on changes over time. How, for example, has the degree of convergence of the Chicago basis changed with the addition of Toledo? And, accounting for the addition of Toledo, has basis convergence been as reliable as earlier? How have these changes affected the ability of country elevators to hedge their stocks?

Although the three CBOT markets are the principal focus, evidence from the Kansas City Board of Trade (KCBOT) wheat market and from the Commodity Exchange of New York (Comex) copper market is also adduced wherever possible to provide some comparisons. The KCBOT wheat market was selected for comparative analysis because it is, after

the CBOT markets, the largest grain futures market in the United States. Copper was selected because it is a storable commodity and subject to pronounced fluctuations in supply and demand like the grains and soybeans. Deliveries on the Comex contracts are by warehouse receipt, also like the CBOT commodities. Insofar as the authors have been able to determine, there have been no persistent delivery problems at either the KCBOT or for Comex's copper contract during the study period. Certainly, there have been no formal manipulation charges brought in either market in recent history.⁴

Nevertheless, it is important to be clear at the outset that neither the Kansas City wheat market nor Comex's copper market is being proposed in any sense as the ideal futures market or even the market that sets the standard against which to compare the performance of the CBOT markets. Rather, evidence from these markets is intended only to help establish, along with the historical data from the CBOT markets themselves, what might be expected about futures markets in delivery. As but one example, the statistics on the size of the largest traders' in the expiring contracts on the CBOT markets show high degrees of concentration are very common. Absent statistics from any other markets, there is no way to know whether this result is a reflection of a continuing problem or, rather, whether it is the normal relation, expected in all futures markets. And, since there have been no previous studies using these data, comparisons with other studies or published results are not possible. Comparisons then to similar statistics from the KCBOT and Comex can help assess the relations on the CBOT.

The approach throughout is empirical. After allowing patterns in the data and relations in them to establish normal (or average) expectations, specific markets, market situations, or recent experience are assessed against those norms. Two specific issues present themselves. First, what was the situation when Toledo was added as a delivery location and, second, how does the most recent situation compare? For example, one measure of the adequacy of today's deliverable stocks is reached by comparing them to stocks in a period before the CBOT felt it necessary to expand delivery space by adding Toledo. Also important are comparisons with the 1987/88 and 1988/89 cropyears, the two cropyears coincident with heightened exchange and CFTC concerns.

As much as possible, analyses of the wheat, corn, and soybean markets begin with the 1964/65 cropyear. Major changes in U. S. government price support and loan program policies occurred at the end of the 1963/64 cropyear and, although their influences varied among the markets, analyses predating these major changes would be heavily influenced by the otherwise exogenous government programs. Some may wonder at the need to

⁴ Comex has, however, recently switched to a contract with a higher grade of copper, and at times monitored closely the positions of large traders.

analyze data from markets of 25 years ago. This longer period is used in part because, whatever the current problems, there is reason to believe that some difficulties date to at least March 1979 and the CFTC emergency action in wheat. Moreover, analyses that predate the addition of Toledo as a delivery location provide comparisons to the relations that prevailed when the CBOT acted to add space. For both these reasons, it is inappropriate to compare the experience of 1988 and 1989 merely to the experience of the early 1980s.

In any case, it is surely inappropriate to judge one or two years' evidence with that of just four or five preceding years as was done in the CBOT's *Studies*. If, for example, the suspicious circumstance is coincident with a general shortage in the market, examining evidence from five years characterized generally by surplus will provide little insight as to whether the current circumstance is a problem or not. It would be much more instructive to examine pertinent relations in the previous five instances of equally severe shortage. In order to do that, 20 or more years of data are necessary to establish relations that reflect enough historical variation to be useful in the desired comparisons.

Four separate periods were initially identified to organize the data and to examine relations among them for possible changes. The first period begins in 1964/65 whenever the data permit. In the early 1970s, major changes in the market environment occurred, with significant increases in U.S. exports and significant declines in the levels of government stocks. Toward the end of that decade, higher prices and expanded production led to periods of increased influences of government programs. Although a major disruption such as the "Russian wheat deal" is readily pinpointed, many other changes vary among markets and cannot be dated so easily. Alterations in contracts at the CBOT began with the July 1973 wheat contract and so the second period begins with the 1973/74 cropyear. It ends with the 1978/79 cropyear, just before Toledo was finally added as a deliverable location in soybeans. The third period is the 1979/80 through 1986/87 cropyears.

Data from two recent cropyears, 1987/88 and 1988/89, were reserved for comparisons with the averages or average relations established from the preceding periods in order to test whether there were any significant changes in these most recent years. This study began more than a year ago and, at the time, the most recent complete cropyear was 1988/89. Thus, all the data and analyses, although current when begun, are already one full cropyear out of date, underscoring that market circumstances change. Undoubtedly, they have in the last year, and to the extent that these changes have alleviated problems identified here, readers will want to modify the conclusions.

The initial estimates of all the relations reported here were for each

of the identified subperiods and, in some cases, those subgroups remain evident in the discussions and tables. In many cases, however, the separate analyses show little significant difference between the results for some or all of the subperiods. Thus, reported results often encompass longer periods, accompanied by discussion of any observed differences.

Finally, the analyses focus on the delivery period and concentrate on examining the fundamental relations observed at specific points in the process. For example, in examining basis convergence, the three principal times at issue are the beginning of the prior month's delivery period, the first day of the current month's delivery period, and the expiration of trading in the current month's delivery. Observations on these specific dates allow measurement of the degree of convergence each month and assessment of its sensitivity to such factors as the timing and location of deliveries. The selection of the specific dates for observation of the prices was guided by the hypotheses being tested. In addition, however, in virtually all the analyses, prices on alternative dates or weekly averages were also examined. In no case did the choice of specific date (or average) change the conclusions drawn from the analyses. At the same time, all of the relations analyzed, whether from specific dates or of continuous observations, are inevitably parts of a much larger simultaneous system, where all variables—deliveries, stocks, concentration, and prices—influence one another. Thus, conclusions about whether observed connections are described better as associations or causal relationships should be circumspect.