WHAT CAN BE LEARNED FROM COMMITMENTS OF TRADERS DATA[1]

Burton G. Cutting
Commodities Corporation (U.S.A.)
Princeton, NJ

Abstract

This paper utilizes commitments of traders data to test group trading performance as a leading indicator of market performance. Following a discussion of commitments of traders data, its sources, composition, and various methods of presentation, a brief review of the literature on this data is presented. A number of the observations raised by the literature review are examined in terms of current CFTC and NYCE data series for cotton traders. Of more than academic interest, many of the insights provided by this data can be useful in the trading of the cotton market.

Introduction

The market statistic open interest[2] represents the number of contracts held by traders at the close of a day's business. Each open contract is a commitment by a trader to make or accept delivery of the commodity at a future time. If all traders are equally ignorant of what the future holds, then who wins and who loses in this exercise of nerves is a matter of luck. But, paraphrasing Orwell, some traders seem to be more equal than others. That is, from a practical point of view, it is important for a trader to have a clear understanding of the potential sources of differential returns found in a market (Teweles, et. al., 1977). Two sources that would be at the top of most lists are the operational characteristics of the market and the acquisition and exercise of market power by traders.

Turning first to the issues of operational characteristics, we are faced with questions of whether the microstructure of the market biases it toward one set of market participants over another (Schwartz, 1988; Pirrong, 1994)? Over the past fifty years, numerous agricultural markets (bran, feed grains, cottonseed oil, etc.), financial markets (French Franc, CPIW, GNMA, etc.) and industrial product markets (zinc, rubber, scrap iron, plywood, etc.) have failed because the operational characteristics were poorly tailored to the needs of their potential participants. Even the massive U.S. Treasury securities market is now coming under critical review for bias as a result of the alleged 1991 "squeezes" in two-year Treasury notes (Pirrong, 1993). Without question, these events have highlighted the importance of understanding the microstructure of a market.

As to our second issue, if a trader can identify a statistical bias in a market, it would be to the trader's benefit to trade with the bias, i.e., follow the group favored by the bias, rather than trying to beat-the-odds. An investigation into market bias is really a return to the problem raised by Teweles, Harlow and Stone: Who gains in the market, who loses in the market, and (why) do differential returns exist? They did not resolve the debate over who gains and who loses in the futures markets, though they addressed the issue and offered suggestions as to what skills are essential for the successful trader. In terms of market theory, however, they left the issue unresolved. Other market analysts have been less hesitant in voicing their opinion. Wall Street analysts Strongin and Petsch (1995) argue that forward selling pushes down longer-dated futures prices, opening up one of the best ways of profiting from commodities exposure - by rolling forward nearby futures contracts to take advantage of chronic backwardation. [Normal backwardation, where back months rise in price as they move toward spot status, could be the result of forward selling pressure moving to the new back contracts (Miller, 1986).] Whether you find evidence that supports the theoretical bias of normal backwardation or evidence that doesn't, the basic issue remains of understanding the distribution of returns to market participants.

Implicitly, we understand that differential returns accrue to various market participants, not necessarily as a matter of luck, but due to other factors (Hartzmark, 1991; Tomek, 1991). What these other factors are is not immedi-ately apparent, but commitments are. Understanding who is committed to make or accept delivery might (a) allow for a more comprehensive - functional - view of the exchange process and (b) provide guidance as to the future direction of the market. The qualification is that not all markets are the same; what we find useful for cotton may not be as valuable when applied to a market dominated by long commercials, such as S&P 500 Index futures or for a market having little forward selling. However, if our approach to analyzing a market's commitment data is sufficiently robust then, we should gain a better understanding of the function of any market studied.

Although the Commodity Futures Trading Commission (CFTC) has trader specific data (01 series) that would answer many of our questions, it will not be made available to the public any time soon. Our alternative is to accept their information series on the position commitments of traders (COT) reported, not on an individual basis, but aggregated by category. That is, open interest reported by category of buyer and seller is domestic contract specific commitments data. This data has been useful in understanding how futures prices are related to expected spot prices (Cootner, 1967; Scholes, 1989; Kolb, 1992), seasonal patterns of hedging use (Gray, 1959; Working, 1960; Peck, 1981), differential returns among market participants (Houthakker, 1957; Rockwell, 1967; Chang, 1985a, 1985b, 1991; Hartzmark, 1986, 1987, 1991), as a leading market indicator (Arnold, 1985; Van Kessel, 1987; Breise, 1994) and in the formulation of market entry and

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 1:410-419 (1996)
National Cotton Council, Memphis TN

exit decision criteria (Zaremba, 1991). Our concerns, however, will be on using this data to gain a better understanding of the exchange process and as a leading indicator of market performance.

The remainder of this essay proceeds as follows. Section I is a discussion of commitments of traders data sources and composition issues. Against the background of a brief review of both street and academic literature, section II discusses some of the problems associated with commitments of traders data. Section III uses commitments data to obtain a better understanding of the exchange process by examining questions of market balance. In section IV we move from questions of general market characteristics to specifics on the trading performance of various groups in the cotton market. The issue of group trading performance will be examined based on a modification of Chang's (1985a) methodology. Section V presents a summary of our discussion and suggestions for further research.

I. COT Data: Sources and Composition Issues

Data series on trader commitments are provided by the (a) Commodity Futures Trading Commission (bi-weekly), (b) the New York Cotton Exchange (weekly), and (c) the New York Federal Reserve Bank (weekly). Each report on trader commitments is unique to the organization producing it, though many similarities exist. Both the New York Federal Reserve Bank and the New York Cotton Exchange (NYCE) series are limited to specific markets. In the former case, the Market Reports Division of the New York Federal Reserve Bank produces the Primary Dealer Positions Report, which is similar (in spirit) to the Commodity Futures Trading Commission's (CFTC) Commitment of Traders Report. The figures provided in this report represent purchases and sales by the primary U.S. government securities dealers reporting to the bank. Along with cash purchases and sales of government related instruments, information on futures and options transactions are also provided. The two reports can supplement each other if the positions of the hedgers in the CFTC report are treated as equivalent to the Fed's primary dealers' positions.

The other market specific report is the weekly speculation and hedging report produced by the New York Cotton Exchange. This report includes 100% of the #2 cotton open interest in futures with all traders classified as either hedgers or speculators. In addition, it indicates whether the trader is a member of the exchange (house) or a customer. With this report on futures positions in the #2 cotton market being the most comprehensive, and its frequency of release being weekly, it can be used as a gage of the slippage in the CFTC's threshold-based report as well as serve as an interim report between CFTC reporting dates. Perhaps its most glaring problem (at this time) is not including information on option positions, which have become a prominent part of the market. Following a discussion of the CFTC data, we will then return to this report and examine it in more detail.

CFTC COT Data

Unlike the two reports mentioned above, the Commodity Futures Trading Commission (CFTC) provides broad market coverage in its material, reporting on approximately 66 markets. The CFTC produces two bi-weekly reports on disaggregated total open interest: The first report is on futures commitments and the second report is on futures and options commitments. Each report provides a breakdown of total open interest for markets in which five or more traders hold positions equal to or above the reporting levels established by the CFTC and the exchanges[3]. Exchange clearing members, futures commissions merchants (FCMs), and foreign brokers are required to make daily reports to the Commission showing each trader's positions on their books that, in any future month of a commodity, exceed the CFTC minimum reporting level. Positions of individual reportable traders are classified either as commercial or noncommercial. These classifications are determined by information supplied by the trader through CFTC Form 40 and by review of the economic analysis section of the CFTC. All of a trader's reported futures positions in a commodity are classified as commercial if the trader uses futures contracts traded in the particular commodity for hedging[4] as defined in the CFTC's regulations (refer to Imel, et.al., 1985; McDonnell and Freund, 1983). Nonreporting traders[5] represent the difference between the total open interest and the reported positions.

As you might expect, the more refined the categorization of buyers and sellers the more useful the data. Although this issue has been investigated and discussed over the years (Arthur, 1971; Gould, 1973), the reporting categories have remained unchanged.

In the attached tables (1, 2 & 3) open interest is broken down into *reportable positions* and *nonreportable positions*. Reportable positions are divided into commercial (hedging) and noncommercial holdings (large speculator) according to the trader's business situation. And, as previously mentioned, nonreportable positions are calculated as the difference between the total open interest and total reported positions. A net position value (long holdings - short holdings) is calculated for each of the three types of traders: commercial traders, reportable noncommercial traders (large speculators), and nonreportable traders. The sum of all long or short positions, as presented in our tables, will not equal exchange reported total open interest by the amount of spread positions held. All of our analysis will utilize non-spread commitment of traders data. A column-by-column explanation of the CFTC report is available from several sources (Horn, 1982; Jiler, 1985;

Shaleen, 1991) and should be consulted. Unfortunately the CFTC does not provide any explanatory material on commitment of traders data and has a working paper series of only 20 papers that stopped in June of 1993.

Open interest held or controlled by a trader is referred to as that trader's position. For CFTC data on futures only positions (table 1) the aggregate of all non-spread long open interest is equal to the aggregate of all non-spread short open interest. This equivalence can be developed into a simple check that helps to keep the data clean[6]. Adding the net positions together for the three groups of traders should equal zero. However, in the CFTC report including delta adjusted options (table 2), the aggregate of all long open interest may not equal the aggregate of all short open interest due to the nature of the arithmetic involved in calculating futures-equivalent holdings[7]. Long (short) call and short (long) put open interest are considered long (short) futures-equivalent open interest. (The CFTC started providing options information as of April 1995 on a test basis; whether the report will continue is dependent on the response of the user community.)

In figure 1, using futures only CFTC COT data, the seasonal variation in net positions of the trading groups can be easily tracked. Figure 2, which uses CFTC futures and options COT data, tells a slightly different story as the addition of options can significantly alter the net position of a group. The differences in the net positions between these two series (table 3) is presented in figure 3. Notice that the nonreportables net position changed at several points in the period examined due to the addition of options positions.

Gray (1959) has emphasized the need to study open interest data: "Study the open interest in any commodity futures contract and you obtain insight into the economics of the commodity, so strong and general is the relationship. Find two commodities for which the open interest pattern differs markedly and consistently and you will find that their production or distribution differs in such a way as to account for the contrasting open interest pattern." The point of Gray's paper is that it is important to understand thoroughly both the components of open interest and the economics of the commodity and its markets; these two areas of study are complements, not substitutes. Gray's evaluation of this data is based on the assumption that the patterns found in the distribution of open interest information are dictated by the hedging use of the futures markets for risk reduction. Understanding what types of businesses constitute the long and short sides of the commercial cotton market can be quite helpful in gaining insight into what moves this market and can provide important information for the development of a viable structural model of the industry (Coleman and Thigpen, 1991). Obviously a thorough study of hedging practices, at least for markets serving a risk reduction function, should provide dividends to any market analyst, not only in terms of the cotton market, but in general (refer to Peck, 1977; Williams, 1986, 1991).

NYCE Speculation and Hedging Report

Based on the CFTC proprietary account definition, the NYCE makes a distinction between a trade made for a clearing member (house) or a trade made for a customer (customer). Using information provided by each clearing member, the NYCE classifies each lot of open interest held as of the close of business on the report date, as spec or hedge. The NYCE captures 100% of open interest since no reporting threshold is used. In conjunction with the CFTC's bi-weekly commitment of traders reports, this report should provide a good interim guide as to the positions taken in the cotton market by the various players. That's the good news.

The bad news is that the numbers provided by the exchange in its weekly report are not in the CFTC format (categories) and, therefore, can only be used as an approximate guide as to the CFTC's distribution of open interest.

Creating a series (Total Hedgers) based on the grouping of all hedgers, whether house or customer, should give a reasonable approximation of commercial activity. Keeping in mind that the customer/house differentiation is largely a clearing tool, for the other two categories (large speculator and nonreporting traders) the following assumptions are used: (a) Customer speculators are assumed to be roughly equivalent to the CFTC large speculator category because a large proportion of NYCE spec positions are probably held at any given time by large funds or commodity pools and by the population of local option traders. Positions in these accounts are likely to be reportable or "large," and, individually, these accounts are more likely to be customer than house[8]. (b) NYCE house speculators are considered equivalent to the CFTC nonreporting category (table 4).

Because the likelihood of similar behavior between two accounts is determined more by the type of account (spec fund vs. options local vs. hedger) than by the whether the account is cleared as customer or house, our distinctions should be verified statistically in terms of their correspondence to the appropriate CFTC series. Using weekly net data for the period from January 1988 through July 1995, we find the following correlation factors:[Net = Long Positions - Short Positions; NYCE data reported weekly; CFTC interpolated across non-reporting weeks]

Set 1 New York Cotton Exchange (NYCE)

NYCE (Net)	Customer Specs	House Specs
Total Hedgers	**-0.99**	**-0.52**
Customer Specs		**+0.47**

Set 2 Commodity Futures Trading Commission (CFTC)

CFTC (Net)	Large Spec	Non-reporting
Hedgers	**-0.98**	**-0.77**
Large Specs		**+0.61**

Set 3NYCE & CFTC Commitment of Traders Series

NYCE (Net)	Total Hedgers	Speculators Customer	Speculators House
CFTC Hedgers	**+ 0.95**	**-0.94**	**-0.46**
CFTC Large Specs	**-0.95**	**+0.95**	**+0.45**
CFTC Non-Reporting	**- 0.67**	**+0.35**	**+0.66**.

The relationships between the various NYCE series (Set 1) follows the correlations found for the CFTC data (Set 2). The relationship between the CFTC and NYCE series (Set 3) are generally correct, but on the weak side for the CFTC nonreportables to the NYCE house specs. Does this lack of correlation represent a problem with one or both of the data sets? The short answer is yes: Because the CFTC uses a threshold criteria for its classification of traders their nonreporting group is a mixture of trader types (Ward and Behr, 1983; Peck, 1980) in contrast to the more homogeneous data set of the NYCE.

Doing a simple statistical check of the reporting differences between the NYCE hedger data and the CFTC hedger data (table 5 & table 6), we find that an adjusted average of approximately 10% of hedge positions go unreported by the CFTC. These positions fall into the nonreportable trader category, thus confusing the matter even more. Adding to the issue is the matter of options, which are probably traded to a significant extent by this reasonably experienced group of closet-hedgers. The bottom-line may be that this group is no longer the flotsam of the market. Although both house and customer speculators include large and small traders alike, on balance, these groupings should provide a reasonable guide to market performance.

By way of summary, the contract categories for the NYCE groups of market participants and their CFTC equivalent reporting categories are,

CFTC Commitments		NYCE Commitments
Commercials	=	House Hedger and Customer Hedger
Large Specs	=	Customer Specs
Non-Reporting	=	House Specs

Figure 4 presents the NYCE net series in the same format used for the CFTC data, again with the relationships between the trading groups different from either of the CFTC reports.

Since a primary objective of this study is to utilize COT data to test group forecast performance as a leading indicator of market direction, it is important to evaluate the commitment of traders data sets (CFTC & NYCE) in a market context. First, we want to evaluate the timing and forecasting (Leuthold, et.al., 1994) performance of the various CFTC trader categories. The methodology used to address this problem has been adopted, with only a few changes, from Chang.

Chang argued that the profitability of futures traders can be fairly measured by examining their timing performance. This is because, given the zero-sum nature of futures trading, a sufficient condition to profit in the market is to be on the right side at the right time. That is, the most successful timer is likely to be the most profitable trader. If futures prices are systematically biased estimates of the expected spot prices, as suggested by the theory of normal backwardation, then we would expect that the probability that a winner would be on the right side of the contract to be greater than that of the wrong side. (Chang, 1985a)

... the statistical procedure that we are going to use requires that the group predictions are known or that a proxy for their market forecasts can be found. As a first approximation the net long or short position taken by a group during each interval is used as a proxy for the forecast of either an up- or down-futures market, under the assumptions that traders' reported commitments were distributed evenly among all contract months and that they were constant across each interval. Given the fact that not all members of a group are on the same side of the market at any instant in time, the net market positions taken are used as the proxy for the groups' average predictions about the directions of price movements. Thus, the results of this study need to be interpreted with care. Members of a group as a whole may have made either positive or negative profits in the market, but the profitability of individual group members have not been examined and may not not be consistent with our findings. Thus, we can view the study as an examination of the profitability of a representative group member who followed a simple strategy of being long when the group was net long and short when they were net short. (Chang, 1985b)

The assumption that winning traders are usually on the right side of the market, along with some new statistical methodology produce the test implications in Chang (1985a, 1985b), which will be applied in section IV.

Second, a comparison of the NYCE and CFTC COT data in terms of general market price behavior should provide some insight into the relative merits of each set of data. Using monthly average values for the period 88/89-94/95, an average monthly net position for each trader category is determined and graphed against a set of seasonal price factors for the period (figures 5,6,7). For both the commercial and large speculator categories, the similarity of the CFTC and NYCE data is excellent. Commercial net values, for each data set, are similar in direction and magnitude and are generally net long when the market is declining and net short when the market is rising. On an average crop year basis, it appears that the net commercial position would be a rather good contrary indicator of

market performance. Net positions for large speculators are similar for both data sets, having similar direction and magnitude throughout the crop year. But unlike the commercial's absolute inverse relationship with the seasonal price factor, this group has a positive association with the movement of the market. The nonreportable net positions are not similar for the two data sets, with significant variation seen in magnitude and direction across the crop year, as would be expected from the correlation results previously presented.

It appears that the choice of data set is more a question of what we desire to prove than which set of data is "best." The CFTC nonreportable data may be the better indicator of market performance while the NYCE "nonreportable" data, having little to no mixture of trader types, would be a good measure of the forecast ability of the proverbial small speculator (refer to section IV). Although the NYCE data may be the more homogeneous and technically correct set of data, it can be argued that the CFTC data is a more accurate reflection of the actual market. Both sets of data have value and should be utilized where appropriate to the problem under investigation. With our focus on market forecasting performance, we will work mainly with the CFTC data throughout the remainder of the paper.

II. Data Problems

However, as wonderful as the commitment of traders data appears it never seems to live up to its potential of providing insight into market performance because of several limitations.

First, we have the arbitrarily defined classification of traders positions: Hedging, speculative or spread for the CFTC series and hedging or speculative for the NYCE commitment series. This problem can be particularly serious when examining long term historical COT data because the CFTC (and its predecessor organizations, the Commodity Exchange Authority and the Grain Futures Association) did not accept anticipatory hedges as legitimate until 1956, reporting threshold levels have been changed repeatedly, the process of data collection relied on disclosure by participants, and the data collected was not inclusive of all participants.

A second problem area is inaccuracies in the reported data: Nonreporting traders are treated as the difference (residual) between total open interest and total reported open interest, and are assumed to be small traders. Treating all residually defined traders as small speculators is a problem that has been discussed in numerous papers (previous citations and Peck, 1980, 1982). Though the residual traders problem has not been the subject of any recent papers, it is still worth reviewing in light of the need for disaggregated data (Hartzmark, 1986, 1987, 1991; Phillips and Weiner, 1994). As noted in our discussion of the various COT data series, the NYCE has addressed this problem in its hedging and speculation report. The trader composition of categories reported by the NYCE appears to be more homogeneous than the CFTC equivalent reporting categories, which may make the NYCE data less useful than the CFTC data. But more on this in section IV.

And, lastly, our third problem is the lack of theoretical clarity - what does the commitment of traders data mean. Each data study using the COT has laid claim to it as either the best source of information or the best proxy variable to substantiate the theoretical issues being investigated. With each new study, the interpretation of the data changes with its evaluation in a new theoretical context.

Based on studies using CFTC COT data for investigation of normal backwardation/risk premiums, the data is proported to show:

(a) Futures markets provide speculators with a risk premium and large speculators generally will make money at the expense of the other market participants. These studies indicate that tracking the markets in terms of the large speculators is the most profitable course of action (Martin and Spahr, 1966; Chang, 1985; Yoo and Maddala, 1991; Chang and Schachter, 1991; Deaves and Krinsky, 1995).

(b) Futures markets do not provide speculators with a risk premium and large speculators will generally lose money, along with small speculators. These studies indicate that tracking the markets in terms of the commercials is the most profitable course of action (Hartzmark, 1986, 1987, 1991; Kolb, 1992, 1993) due to the apparent lack of large speculator profitability.

An alternative (but not mutually exclusive) explanation of trader performance is based on markets functioning as information pools. That differential information can affect prices and profits in financial markets has been demonstrated formally in recent research (Grossman and Stiglitz, 1980; Chang, 1991; Phillips and Weiner, 1994). From this research a literature has developed based on asymmetrically informed market participants, with the less informed referred to as 'noise traders' (Black, 1986).

In this theoretical context of asymmetric-information distribution, the performance of traders with better information will gain at the expense of uninformed or 'noise' traders. Thus, if traders who operate in the cash market (commercials) have superior information about future supply and demand conditions, the prediction of the normal-backwardation model can be reversed (Phillips and Weiner, 1994). However, if the large speculators are seen has having better information, then the normal-backwardation model is validated. On this last point more needs to be said. Chang and Schachter (1991)

argue "that large speculators are the best informed participants in the futures markets because (a) their trading is based on the expectation of gain since they obtain no benefit of risk reduction, (b) they have a greater incentive to acquire information as a result of having more capital at risk, (c) they have the necessary resources to spend on information acquisition activities, (d) they have the the lowest commissions, so that the profit from an information trade is larger at the margin, and (e) their constant market presence makes these traders better informed about institutional factors affecting the market, and gives them readier access to sources of information." Following up this argument are two interesting footnotes. The first references a 1984 CFTC study which examined the potential access of traders to private information: This study concluded that those most likely to have access to private information were large traders in general, and large speculative traders in particular. Chang and Schachter's other note deals with the practical aspects of hedgers involvement in the market: "Even though hedgers can make speculative trades, some trading by hedgers will be unrelated to information. For example, trades by hedgers can be passively related to the particular hedging policy followed. Further, the scope of information of interest to hedgers is likely to be limited to factors affecting the riskiness of their hedge (basis risk), while, in principle, speculators are interested in any information related to price."

The classic theory of normal backwardation, based on the concept of risk transfer, assumes that, on average, speculators should gain and hedgers should lose in the futures markets. To date the evidence seems to be equally divided between confirming the theory and disproving it. Whether to follow the commercials or the large speculators is still an open question based on this body of research. In contrast, the asymmetric-information view of trader performance predicts that traders with better information will gain at the expense of uninformed or 'noise' traders. Within this context the question then becomes which group of traders are the best informed? Apparently re-defining the market and the role various participants have in it will not move us any closer to explaining whether or not the market has a group bias.

So where do we start to solve this puzzle of theoretical clarity in COT data? The problem in understanding COT data is part of the larger issue of market explanation, which is not a problem that can be easily resolved. Perhaps an approach to this problem is to first start with a general examination of the distributional characteristics of cotton market commitments, followed by an examination of the forecasting performance of the various trader categories. Understanding who is committed to make or accept delivery might (a) provide guidance as to the performance characteristics of the market and (b) allow for a more comprehensive view of this exchange process. From this general market assessment we can expect to gain a better understanding of who participates in the market and to what extent they could potentially shape its direction (section III). Our forecast assessment (section IV) of the COT data then speaks directly to the problem of differential returns.

III. Market Balance

Over the past twelve crop years the growth in CFTC reportable commitments[9] for NYCE #2 cotton has been substantial and nearly constant (table 7). Growth in commercial and large speculator positions has been at the expense of the nonreportable segment that has seen its commitment level decline from an average of 43.35% of total open interest in 1983/84 to 24.01% in 1994/95.

Putting these significant changes in contract terms, in 1983 reportable traders accounted for an approximate daily average of 14,489 contracts, or 56.65% of total open interest (table 8 & figure 5). By the end of the 1994/95 crop year, reportable traders accounted for 75.99% of average daily open interest, or approximately 53,853 contracts. This represented an increase of 272% in the number of contracts held by the reportables on an average day. A quick review of the numbers indicates that reportable long commitments grew substantially over the period, with reportable shorts also seeing some growth.

The nonreportable side of the market saw their average daily open interest position increase in absolute terms, moving from 11,088 to 17,016 contracts during the 83/84-94/95 period. This increase in position occurred during a period that saw the average daily total open interest grow from 25,577 contracts to 70,869 contracts (an increase of 177%).

Taking a longer view (67/68-94/95) of the changes in the balance of the market between the reportables and the nonreportables, we have seen the absolute number of daily positions held by the reportables increase by a factor of 20+ while the nonreportable positions increased by a factor slightly less than 4. During this period the average daily total open interest grew from 7054 contracts in 67/68 to 70,869 contracts for the 94/95 crop year. Although the nonreportables are not a dominant factor in the market today, they still constitute 24% of total open interest and probably have more than a marginal influence on its performance. And, as previously mentioned, this group is not a homogeneous collection of small traders but a mixture of trader types. More on this issue of group composition will be addressed in our discussion of market forecasting ability in section IV.

Viewing the data in speculator versus commercial terms, we see that commercials have moved from an average commitment of 32.36% in 67/68 to 60.46% in 94/95 while the speculators have declined from 67.64% to 39.54% over the same period. For the more recent period (83/84-94/95), the change was less dramatic but significant nonetheless

(49.54% to 60.46% for commercials and 50.47% to 39.54% for speculators). Average percentage CFTC commitments for the later period show a market with 54.49% of positions held by commercials and 45.51% held by speculators, a distribution that could be characterized as nearly equivalent.

In our examination of the cotton market, we have assumed that the average of commercial long and short commitments provided an indication of the balance between two major categories of participants: Those representing commercial interests and those representing non-commercial interests. What trader type populates these categories is somewhat in the eye of the beholder. If a futures market is seen as facilitating risk re-distribution, then it would be critical to have a balance between those wishing to offset risk and those willing to assume it. If a futures market is seen as an information pool, then it is important to have a diversity of information sources, with no single opinion or type of information dominating the market. Whether the market is seen as serving a Keysian insurance purpose or as a Darwinian battleground between Black's informed and noise traders is of secondary importance to the need for a market to achieve a perceived balance between its core participants.

Our search for balance in the cotton market needs to be placed in the context of the natural seasonal cycle of production and distribution of this agricultural commodity. When attempts are made to smooth out the natural seasonal cycle, then the market will cease to exist. This has happened to cotton and other commodities when the government decided to move from the role of sub-contractor to that of chief architect. The uncertainty of production factors will always be with us, but the market risk inherent in the seasonal cycle is the *reason d'etre* of the market. Take away the 'natural' market risk for a commodity and you take away the market. It is in terms of differing market risk evaluations that participants will commit to a position in the commodity, thus making a viable market. From a trading perspective, the 'natural' market risk of the seasonal cycle may constitute the primary source of differential returns found in the market. Adding to this source of differential returns are the organizational factors of the market. With some participants focused on trading the basis and others on trading the price, market organization can be a significant source of differential returns. As indicated by Gray (1959), understanding what types of businesses compose the market's long and short commercial interests can be helpful in gaining insight into what moves the market. It is within this context of both the 'natural' and organizational sources of market bias that a market should be evaluated as balanced or unbalanced. If the organizational factors of the market, both micro- and macrostructure, distort the 'natural' seasonal cycle bias, then the market can be considered unbalanced. But in favor of which market group? Perhaps the bias is favorable to the exchange itself (Greising and Morse, 1991)?

What the ideal balance is for a market is open to discussion and further examination, but most students of futures markets would agree that markets can become lopsided or biased toward a favored group. As noted above, whether the factors that distort ('unnaturally' bias) the market derive from its microstructure or from attempts by others (i.e., government agencies) to reduce the seasonality of the market (macrostructure), the results of an unbalanced market can be seen in its functional organization. Without addressing this issue further, perhaps, by reviewing the distribution between long and short hedgers for a broad range of markets, the 54.49% to 45.51% distribution of trader commitments found in the cotton market can be characterized more accurately.

Looking at a group of domestic commodity markets on a calendar year basis (table 9) for the 1991-1994 period, the maximum average percentage commercial commitment was 76.62% on the long side and 83.69% on the short side of the market, both for natural gas (NYMEX). The minimum average percentage commercial commitment was 11.85% on the long side (CME pork bellies) and 14.11% on the short side (NYF composite index) of the market. Within the context of these 38 markets, cotton has an average commitment of 56.94% on the long side and 57.73% on the short side; it ranked 13th highest on the long side and 22nd highest on the short side, with an average ranking of 17th overall. From the perspective of the non-commercial market participants, cotton exhibits a speculator commitment of 43.06% on the long side and 42.27% on the short side. Graphically (figure 9) cotton is seen in the center of the distribution of markets, dominated neither by the commercial side nor the speculator side, though showing a slight inclination toward the commercial.

On a macro level, and from the perspective of the CFTC data, the cotton market appears to be rather average when viewed against the background of other domestic markets. This is further substantiated if we examine the relationship between the ratio of position traders to day traders. Using total open interest as a proxy for position traders and volume as a proxy for day traders, a market turnover ratio can be calculated. Against the set of agricultural markets previously reviewed (table 9), cotton has an average daily ratio of 6.04 which is mid-way between pork bellies (3.13) and cocoa (9.13). Again, cotton appears to be average.

Even with all of the CFTC's data problems, these results would be approximately the same if the NYCE commitment data were used: The NYCE #2 cotton market appears to be an average domestic futures market exhibiting a slight inclination toward the commercial. In general, the cotton market should be described as balanced between long and short hedgers and between hedgers and speculators. But does this "balance" mask factors that are inhibiting the growth of the market? What would the market look like if the USDA freely reported on all aspects of the cotton

industry - if the artificial constraints on the distribution of information related to the industry were non-existent? In terms of general market characteristics, however, the exchange seems to be doing well. Turning next to the performance of the specific categories (commercial, large spec, nonreportable) of commitments, the results may differ by data set and may indicate a bias to the market.

IV. Group Trading Performance

Moving from concerns of general market organization and function to the trading performance of various groups in the cotton market brings to the forefront the problem of differential returns: Is one group favored over others across all types of markets, some types of markets? As discussed above there is evidence that one group of traders may consistently profit at the expense of other market participants. Van Kessel (1987) states: "The largest specula-tors have the habit of being right, not individually, but as a group. Therefore, what the large speculators are doing and what their attitudes to a market over several months have been must have some implication for the price over time... Often, if one studies the commitment of traders, one can come to correct thinking about the market, if one can catch the logic (usually fundamental) of why the big traders are so biased about the price outlook." Interesting observations, but Van Kessel does not offer any data to support either his contention that large speculators are often right as a group or that they have a biased price outlook. But other analysts take a different view. The Brock Report (September, 1994) argues that commodity "funds are more often long than short and ... over the long term do not have a good track record of making money in agricultural markets." Briese argues in a 1994 *Futures* article, "Tracking the big foot," that following "commercial hedgers - when they become onesided in their market view - has proved far more profitable than riding the coattails of large speculators or fading small traders. Large specs were reliable only 46% of the time, small traders only 45% in predicting significant market moves in the *Bullish Review* study." Commodity Trend Services 1991 pamphlet, "How to use net traders positions for bigger profits" and Curtis Arnold, "Tracking 'big money' may tip off trend changes" (Futures, 1985) both believe that following the commercials is the way to go. Perhaps Arnold best expressed the conventional wisdom on why it seems so reasonable to follow the commercials: "In the futures market, the traders classified as "commercials" are like the stock market's "insiders." Their business is to produce or deal in the underlying physical. So it is only reasonable to expect them to be more attuned to their commodities' future price prospects than someone outside the industry." Again, more impressions of what the situation is thought to be without any attempt at a quantitative assessment of the actual performance of the various groups.

In this section we will examine the timing and forecasting ability of the commercials, large speculators and nonreportables in order to provide a statistical base for further discussion of who wins, who loses, and why. In this section the issue of group trading performance will be addressed using the methodology presented in Chang (1985a). Chang's methodology is a modification of the nonparametric timing performance evaluation procedure developed by Henriksson and Merton (HM, 1981), with Chang and Stevenson's (1985b) summary presented below.

Methodology

The rational behavior of risk-averse speculators in futures markets can be described as follows: they will only be long futures contracts at prices below those expected at the anticipated liquidation time, or will be short such contracts at prices above those prevailing at the expected offset period. Let F(t) denote the price of futures contracts at t, and R(t) denote the change in futures prices during period t, that is, R(t) = F(t) - F(T-1). Thus, before taking actions in the market, the speculator either forecasts that R(t) > 0 or that

R(t) <= 0. Following HM, we define

$P_1(t)$ = prob[forecast market is down | R(t) <= 0] (1a)

$P_2(t)$ = prob[forecast market is up | R(t) > 0]. (1b)

Therefore, $P_1(t)$ is the conditional probability of a correct forecast given that R(t) <= 0, and $P_2(t)$ is the conditional probability of a correct forecast given that R(t) > 0. It is assumed that $P_1(t)$ and $P_2(t)$ do not depend upon the magnitude of |R(t)|. Hence, the conditional probability of a correct forecast depends only on whether or not R(t) > 0.

Under this assumption, Merton (1981) shows that a necessary and sufficient condition for a speculator's prediction to have no value is that the sum of the conditional probabilities of a correct forecast $P_1(t) + P_2(t)$, equals one. [When an investor's prediction is of no value, for example, in the common stock market, it is implied that no abnormal return is received. Since trading in the futures market is a zero-sum game, a prediction of no value is a sufficient condition such that traders are not consistent winners in futures markets.] It follows that a necessary condition for timing speculation to have a positive value is $P_1(t) + P_2(t)$ not equal to one. Specifically, a sufficient condition for a positive value is $P_1(t) + P_2(t) > 1$.

Accordingly, we will estimate the conditional probabilities of a correct forecast for ... traders given R(t) <= 0 and R(t) > 0. Then we perform a test of the null hypothesis that the ... traders have earned no positive profits by test Ho: $P_1(t) + P_2(t) = 1$. A detailed discussion of the distributional properties of the statistics can be found in Chang [1985a].

Findings

Our discussion of CFTC and NYCE COT data series in the preceding sections touched on most of the data issues relevant to this study, with just a few additional considerations needed: First, all CFTC futures only data was expressed as weekly values, with bi-weekly and

monthly reported values re-expressed (interpolated) as weekly. This data did not have to be re-expressed and adjusted to a weekly periodicity, but doing so made the analysis substantially easier. Second, we assume that the values established for a given week were constant throughout the week and that the values were always reported on the last trading day of each weekly interval.

Two statistical evaluations were conducted, the first to assess market timing ability and the later to evaluate market forecasting skill: (a) Where the net values for a week were evaluated against the price change for the week (last business day close - first business day close) and (b) where the net values for a week were evaluated against the price change for the following week. Unlike previous studies of group trading performance, test (b) was designed to accord with the reality of the market in that trading on information can only be done after it is known by the trader.

One last point, if the data interval selected was monthly rather than weekly, a simpler test of market performance would be an assessment of backwardation behavior via a buy-and-hold strategy. A few studies have found some support for backwardation in the cotton market (Labys and Granger, 1974; Kolb, 1992) although these studies were generally not favorable to the theory of normal backwardation. The idea and implementation of a buy-and-hold strategy is that the investor takes a long position in a contract and holds it until the day before it becomes spot, when the position is rolled into the next sequential contract. If new contract's were available monthly then the buy-and-hold strategy would be equivalent to taking a long position at the first of the month and closing it out at the end. For our purposes the basic idea was retained but the execution was adjusted to allow for variations in contract sequences.

A buy-and-hold test was conducted on NYCE #2 cotton for the period 6/30/67 through 6/30/95 with the results (table 12) indicating the existence of some form of backwardation. However, the results were not uniform over the period or by contract. Results for the period up to 6/30/86 showed profitability for the strategy, which was statistically significant only if the July and October contracts were excluded. These contracts were also a problem for the period after 6/30/86, where backwardation was found to exist in both homogeneous (i.e., Mar only series) and mixed sets (i.e., Dec-Mar-May) of contacts. If the July and October contracts were excluded, the profitability and statistical significance was substantially higher per contract. The net result of this investigation was that the Dec-Mar-May contracts appeared to be biased to the long side of the market and the July-Oct contracts appeared to be biased to the short side of the market. These results can be explained rather well by Cootner's net hedging hypothesis (Cootner, 1967) which, following Sharpe, argues, that for some markets, hedgers need to attract long specs during the part of the year when stocks are large and short specs during the periods when stocks are small. Sharpe adds that if "speculators have to be rewarded for bearing the risk involved, prices of futures contracts may be expected to rise when hedgers are short and speculators long, then fall when hedgers are long and speculators short. Another version [of the net hedging hypothesis] holds that futures prices may be expected to rise when there is a large amount of net short hedging and fall when there is either a small amount of net short hedging or net long hedging."

The suggestion that hedgers may choose to be long on the futures market may seem surprising. At any time some people (e.g., farmers, grain elevator operators) with too much inventory for their comfort will wish to short hedge, while others (e.g., processors) with commitments in excess of inventories will wish to long hedge. When total stocks are large, the former may outnumber the latter, and there will be net short hedging, requiring speculators to make up the gap with long positions. As inventories fall, the balance may begin to shift, leading eventually to net long hedging, requiring speculators to make up the gap with short positions (Sharpe, 1989)

Sharpe's comments indicate that, from a theoretical viewpoint, some background material can be found for our net position approach to both general market analysis and group performance evaluation. The merits of our buy-and-hold strategy results represent a preliminary confirmation of some market backwardation (bias) inherent to cotton. The following performance evaluation of CFTC and NYCE COT data series will attempt to rigorously substantiate the inherent bias of the cotton market.

In table 10, the results for CFTC commercials indicate that they exhibited no positive timing (same week) or forecast (next week) ability during any of the time periods reviewed, whether the market was up or down. These results are similar to those reported by Chang (1985a) for corn, wheat, and soybeans for the 1957-1980 period.

Over the entire period of 67/68-94/95 large speculators were found to have the highest up market probability of success (timing and forecasting) with the December and March contracts. For all the time periods examined, the July and October contracts had the lowest up market success rate for large specs. But, for down markets, these contracts had the highest probability of success over the 91/01-95/07 period.

Nonreportables were found to be most successful with the March contract across all time periods, with the October and December contracts also being successful over the last period reviewed. The nonreportables showed a timing ability that was, in general, equal to the large specs and a forecasting ability that was only a notch or so lower. Again, these results should be compared to Chang's (1985b) to get

a feel for how robust they are.

The NYCE COT data series (table 11) presents similar results for both the commercials and large specs, with the probability being a little higher for the large specs and lower for the commercials. And, like the CFTC data, the same contracts (July and October) were found to have the lowest up market probability and the highest down market success level. The down market timing ability of the NYCE large specs was better than the CFTC equivalent group, but weak overall. NYCE nonreportables were found to have only moderate timing ability but no forecasting ability; their forecasting skill was virtually zero. What success was found for this group was limited to up markets and again, the December-March-May contracts. The reason that timing ability appeared as strong as it did could be due to a skew in prices over the analysis period, but more likely it is an artifact of the retail market: The small specs are given good advice by "house analysts" as to market position but are unable to stand the volatility/pain of the market.

The major difference between the two sets of data (CFTC and NYCE) is seen in the forecasting ability test. For the CFTC data set, large specs generally have a higher level of success in forecasting than in timing. This also holds true for the commercials who are found to have a level of success in forecasting ability than timing ability in two of the three periods examined. Perhaps timing would be the most successful attribute if the data series were not interpolated over a large percentage of the weeks for the period prior to 91/01. Using the 91/01-95/07 period as the most technically correct, we find that the CFTC commercial's had a lower forecasting ability than timing ability while the large specs continued to maintain a generally superior ability to forecast. During this period nonreportables also had a lower success rate in forecasting than in timing, as expected. Looking at the NYCE data for the same period, the commercials have their highest success rate in forecasting and the large specs their lowest in forecasting; just the opposite of the CFTC equivalent series. However, the NYCE and CFTC data sets are in agreement on the fundamental facts that large specs exhibit both timing and forecasting ability and that commercials do not exhibit any positive timing or forecasting ability. Remember that these results are a first approximation and that as a matter of refinement, a great deal of data cleaning and analytical adjustments can be done. But, the results would still show a high degree of backwardation and contract bias as explained by Cootner's net hedging hypothesis.

From this review of group trading performance (timing and forecasting) what can be concluded? (a) The results tend to confirm our preliminary buy-and-hold strategy findings which indicated that a form of backwardation exists in the cotton market. (b) And, as would be expected in a market exhibiting backwardation, the specs are generally successful at market timing and forecasting. (c) The contracts giving the specs the highest probability of success (December-March-May) and the lowest chance of success (July-October) were found to be the same for both the CFTC and NYCE data sets. (d) The proverbial small specs (NYCE nonreportables) were found to have no forecasting ability; the CFTC nonreportable group demonstrated significant ability at market timing and forecasting.

V. Summary

In this paper on trader commitments we discussed the available data sources with an emphasis on the CFTC and NYCE cotton market series. It was found that the NYCE series was the more technically correct of the two series but lacks futures-equivalent options information. The CFTC series appears to under-report hedgers commitments by approximately 10%, with these positions falling into the nonreportable category. For both the commercial and large speculator categories, the similarity of the CFTC and NYCE data is excellent; the nonreportable series are not similar for the two data sets, with significant variation seen in magnitude and direction across the crop year. Although several problems were found with the construction of both data sets, the primary difficulty is that understanding and using COT data is part of the larger issue of explaining the performance characteristics of the market (Keynes, 1930; Hicks, 1946). Without addressing these issues directly, we first examined who the market participants are and their respective distribution. The CFTC distribution of commitments between the various trader categories in cotton was examined for the 67/68-94/95 period, which found that commercials have moved from an average of 32.36% in 67/68 to 60.46% in 94/95 while speculators have declined from 67.64% to 39.54% over the same period. The distribution of cotton commitments was compared to the distributions found in 38 other commodities over the calendar year period of 91-94 with the result that cotton again appeared rather average. A market turnover or breath ratio was calculated for cotton and compared to 18 other domestic agricultural markets over the 91-94 period, with the result that cotton was at the average. From this macro review of the distribution characteristics of CFTC cotton commitments, it was concluded that the market was "balanced" between long and short hedgers and between hedgers and speculators. In nearly every respect this market was found to be average.

Turning next to the performance of the specific categories (commercial, large spec, nonreportables) of commitments, three statistical evaluations were reported. (a) A buy-and-hold strategy was reviewed as a preliminary indicator of possible market backwardation followed by two category specific evaluations, the first to assess (b) market timing ability and the later to evaluate (c) market forecasting skill. The results of the buy-and-hold strategy where profitable but not uniform over the 6/30/67-9/29/95 analysis period, with the December-March-May contracts found to be biased to the long side of the market and the

July-October contracts biased to the short side of the market. These results were explained by Cootner's net hedging hypothesis and indicated a form of backwardation existent in the cotton market. And, as would be expected in a market exhibiting backwardation and positive returns from a buy-and-hold strategy, the specs were found to be generally successful at market timing and forecasting. The contracts giving the specs the highest probability of up-market success (December-March-May) and down-market success (July-October) were found to be the same for both the CFTC and NYCE data sets. The proverbial small specs (NYCE nonreportables) were found to have no forecasting ability; the CFTC nonreportable group demonstrated statistically significant market timing and forecasting ability.

Endnotes

1. All graphs and tables can be obtained from the author upon request.

2. Open interest is the number of futures contracts which have been entered into and not yet liquidated by offsetting contracts nor fulfilled by delivery as of the close of trading. These contracts arise when a buyer or seller enters the futures market and takes a new position. When the same buyer or seller liquidates the position by an offsetting futures transaction, including making or taking delivery, open interest is accordingly reduced. Open interest is both a measure of the transaction level of the market and an intertemporal measure of business *commitment* linking one trading session with the next. The only other market statistic having an intertemporal component is price.

In contrast to open interest we have volume which is the total of purchases or sales for a given trading session and includes day traders and scalpers who generally enter and exit positions within the same business session. Both open interest and volume are measures of market transaction activity and are valuable in assessing market balance and strength. However, among market statistics, only open interest and price share an intertemporal component.

Yet one unique feature of open interest remains. When open interest commitments are reported by type of buyer or seller, where for each commodity the sum of open interest for all listed contracts (total open interest) is disaggregated into a typology of trader types based on the transactional component of tyhis measure of market activity, the structural characteristics of the market become more apparent as numerous studies have indicated. And when these disaggregated data series are used in conjunction with price information, insights into market behavior may be obtained.

3. The CFTC's futures reporting level for NYCE #2 cotton is 5,000 bales (100 contracts). On the options side of the market, the reporting level is estab-lished by the exchange, with the NYCE setting a threshold of 25 nearby options or 50 differed options.

4. Hedging: Bona fide hedging transactions and positions mean transactions and positions in a contract for future delivery on any contract market, or in a commodity option, where such transactions or positions normally represent a substitute for transactions to be made or positions taken at a later time in a physical marketing channel, and where they are economically appropriate to the reduction of risks in the conduct and management of a commercial enterprise, and where they arise from: (1) The potential change in the value of assets which a person owns, produces, manufactures, processes, or merchandises or anticipates owning, producing, manufacturing, processing, or merchandising; (2) The potential change in the value of liabilities which a person owns or anticipates incurring; or (3) The potential change in the value of services which a person provides, purchases, or anticipates providing or purchasing.

If the reporting trader's use of the futures or option markets conforms to this general definition, then the trader most likely will be classified as a commercial. The type of occupations that would be considered bona fide hedgers would be

□ For all futures or option markets other than financial instruments and foreign currencies: (1) producer/feeder of livestock or poultry; (2) other producer, including growers of all plant crops and timber, metal miners, etc.; (3) merchant or dealer; (4) processor, such as miller, crusher, manufacture, packer, slicer, refiner, fabricator, etc.; (5) end user/consumer, for example, an airline hedging fuel for consumption; (6) swaps or derivatives dealer; (7) other.

□ For futures or option markets in financial instruments (e.g., T-Bonds, Eurodollars, and stock indices): (1) dealer in financial instruments; (2) financial intermediaries, including commercial banks, saving and loans, credit unions, mutual savings banks, mortgage banks; (3) investment groups, including pension funds, mutual funds, college endowment funds, insurance companies; (4) other.

□ For futures or option markets in foreign currencies: (1) currency dealer/broker; (2) importer/exporter; (3) foreign investor; (4) swaps or derivatives dealer; (5) other.

5. Trader's positions that are below the CFTC reporting threshold levels are classified as "nonreportable." The aggregate long and short open interest shown as nonreportable positions are derived from subtracting reported positions from total open interest. Accordingly, for nonreportable positions, the number of traders involved and the commercial/noncommercial classification of each trader are unknown.

6. Given the following market clearing equations (A & B),

we obtain a simple data quality check (equation C) by substraction: Equation A - equation B = equation C. All of the variables used in the equations listed below represent non-spread values.

A. **H(L) + LS(L) + NR(L) = TOI**
B. **H(S) + LS(S) + NR(S) = TOI**
C. **[H(L)-H(S)] + [LS(L)-LS(S)]+[NR(L)-NR(S)] = 0**

Where H(L) = commercials long;
H(S) = commercials short;
LS(L) = large specs long;
LS(S) = large specs short;
NR(L) = nonreportables long;
NR(S) = nonreportables short;
TOI = total open interest.

7. Futures-equivalent: The futures-equivalent of an option position is the number of options multiplied by the previous day's risk factor or delta for the option series. For example, 10 deep out-of-the-money options with a risk factor of 0.20 would be considered 2 futures-equivalent contracts. The delta or risk factor used for this purpose is the same as that used in delta-based margining and risk analysis systems.

8. Suggestion made by Tim Barry of the NYCE.9. The CFTC commitment of traders numbers used in this essay represent the total non-spread commitments reported. On the other hand the NYCE numbers account for all positions taken, inclusive of spread positions. Coupled with this position accounting difference is the total open interest provided by the exchange which includes all open contracts, whether outrights or spreads. Because of these data issues and several others (e.g., the lack of inclusiveness in the CFTC series, problems of data quality, etc.) it was felt that the numbers discussed should serve only as a reasonable proxy for market activity during the observation period. They should not be considered definitive.

9. The CFTC commitment of traders numbers used in this essay represent the total non-spread commitments reported. On the other hand the NYCE num-bers account for all positions taken, inclusive of spread positions. Coupled with this position accounting difference is the total open interest provided by the exchange which includes all open contracts, whether outright or spreads. Because of these data issues and several others (e.g., the lack of inclusiveness in the CFTC series, problems of data quality etc.) It was felt that the numbers discussed should serve only as a reasonable proxy for market activity during the observation period. They should not be considered definitive.

Disclaimer

References

Arnold, Curtis, "Tracking 'Big Money' May Tip Off Trend Changes," Futures, Feb. 1985.

Arthur, Henry B., *Commodity Futures as a Business Management Tool*, pp. 215-226, Graduate School of Business, Harvard University, 1971.

Black, Fischer, "Noise," The Journal of Finance, vol. XLI, No. 3, pp. 529-543, July 1986.

Briese, Stephen E., "Tracking the big foot, Steve Briese," Futures, pp. 38-40, March, 1994.

Brock, Richard, "Commodity Funds - Friend or Foe?," The Brock Report, September, 1994.

Chang, Eric C., "Returns to Speculators and the Theory of Normal Backwardation," The Journal of Finance, Vol. XL, No. 1, March 1985a, pp. 193-208.

Chang, Eric C. and Richard A. Stevenson, "The Timing Performance of Small Traders," The Journal of Futures Markets, Vol. 5, No. 4, pp. 517-527 (1985b).

Chang, Eric and Barry Schachter, "Interday Vaariations in Volume, Variance and Participation of Large Speculators," Commodity Futures Trading Commission, Working Paper No. 91-2.

Coleman, Jonathan and M. Elton Thigpen, An Econometric Model of the World Cotton and Non-Cellulosic Fibers Market, World Bank Staff Commodity Working Paper, No. 24, 1991.

Cootner, Paul H., "Speculation and Hedging," Food Research Institute Studies, Supplement to Vol. VII, 1967.

Deaves, Richard and Itzhak Krinsky, "Do Futures Prices For Commodities Embody Risk Premiums?," The Journal of Futures Markets, Vol. 15, No. 6, 637-648 (1995).

Gould, Bruce, *Dow Jones-Irwin Guide to Commodities Trading*, pp. 47-50, Dow Jones, New York, NY., 1973.

Gray, Roger W., "The Importance of Hedging in Futures Trading; and the Effectiveness of Futures Trading for Hedging," pp. 223-234, in Views from the Trade, A. E. Peck, editor, Chicago Board of Trade, 1978.

Greising, David. and Laurie Morse, *Brokers, Bagmen, and Moles*, John Wiley & Sons, Inc., 1991.

Grossman, Sanford J. and Joseph E. Stiglitz, "On the impossibility of informationally efficient markets,", American Economic Review, 1980, vol. 70 (June), pp. 393-408.

Hartzmark, Michael L., "The Effects of Changing Margin Levels on Futures Market Activity, the Composition of Traders in the Market, and Price Performance," Journal of Business, 1986, vol. 59, no. 2, pp. 147-180.

Hartzmark, Michael L., "Returns to Individual Traders of Futures: Aggregate Results,", Journal of Political Economy, 1987, vol. 95, no. 6, pp. 1293-1306.

Hartzmark, Michael L., "Luck versus Forecast Ability: Determinants of Trader Performance in Futures Markets," Journal of Business, 1991, vol. 64, no. 1, pp. 49-74.

Hicks, John R., *Value and Capital*, 2nd ed., Oxford University Press, 1974.

Horn, Frederick and Victor Farah, *Trading in Commodity Futures*, pp. 305-308, New Institute of Finance, New York, NY., 1979

Houthakker, H. S., "Can Speculators Forecast Prices?," Review of Economics and Statistics, Vol. XXXIX, No. 2, 1957 (pp. 143-151).

Imel, Blake, Ronald Hobson, and Paula Tosini, "The CFTC's Hedging Definition: Development and Contemporary Issues," Center for the Study of Futures Markets, Working Paper Series, #CSFM 119, October, 1985.

Jiler, William, "Analysis Of The CFTC Commitments Of Traders Reports Can Help You Forecast Futures Prices," 1985 CRB Commodity Yearbook, Commodity Research Bureau, New York, NY.

Van Kessel, Henry, "Contrary Opinion," Technical Analysis of Stocks & Commodities, 1987, pp. 210-213.

Keynes, John M., *A Treatise on Money*, vol. 2, The Applied Theory of Money, MacMillian, London, 1930.

Kolb, Robert W., *Understanding Futures Markets*, 3 ed., New York Institute of Finance, N.Y., 1991.

Kolb, Robert W., "Is Normal Backwardation Normal?," The Journal of Futures Markets, Vol. 12, No. 1, 75-91 (1992).

Labys, Walter C. and C.W.J. Granger, *Speculation, Hedging and Commodity Price Forecasts*, chapter 5, D.C. Heath and Company, 1970.

Leuthold, Raymond, Philip Garcia, and Richard Lu, "The Returns and Forecasting Ability of Large Traders in the Frozen Pork Bellies Futures Market," Journal of Business, 1994, vol. 67, no. 3, pp. 459-473.

Martin, Stanley A. and Ronald W. Spahr, "Futures Market Efficiency as a Function of Market Speculation," Review of Research on Futures Markets, 1983, pp. 314-328.

Miller, Stephen E., "Forward Cash Contracting in Cotton," The Journal of Futures Markets, Vol. 6, No. 2, 249-259 (1986).

McDonnell, William B. and Susan K. Freund, "The CFTC's Large Trader Reporting System: History and Development," The Business Lawyer, May, 1983, pp. 917-951.

Peck, Anne. E., "Reflections of Hedging on Futures Market Activity," Food Research Institute Studies, Vol. XVII, No. 3, 1979-1980.

Peck, Anne E., "The Role of Economic Analysis in Futures Market Regulation," American Journal of Agricultural Economics, pp. 1037-1043, December, 1980.

Peck, Anne E., "Estimation of Hedging and Speculative Positions in Futures Markets Revisited," pp. 181-195, Food Research Institute Studies, Vol. XVIII, No. 2, 1982.

Philips, Gordon M., and Robert J. Weiner, "Information and Normal Backwardation as Determinants of Trading Performance: Evidence From The North Sea Oil Forward Market," The Economic Journal, 104, (January), 76-95.

Pirrong, S. C., "THe Market for Treasury Derivative Securities: Microstructure and Market Power," MIDAMERICA Institute, U.S. Treasury Securities Market: The Scholars' Assessment, Vol. 1, April, 1993.

Rockwell, C., "Normal Backwardation, Forecasting and the Returns to Commodity Futures Traders,", Food Research Institute Studies 7, Supplement, 1967.

Schwartz, Robert A., *Equity Markets: Structure, Trading, and Performance*, Harper & Row, Publishers, 1988.

Shaleen, Kenneth H., *Volume and Open Interest*, Chapter 10, pp. 139-152, Probus Publishing Company, 1991.

Sharpe, William, Investments, 3rd. edition, pp. 539-546, Prentice-Hall, Inc., 1985.

Strongin, Steve and Melanie Petsch, "The Mid-Cycle Pause: A Buy Signal for Commodities," Commodity Research, Goldman Sachs, July, 1995.

Teweles, R., C. Harlow and H. Stone,*Commodity Futures Game*, chapter 2, McGraw-Hill, Inc., 1977.

Tomek, William G., "Dependence in Commodity Prices: A Comment,", The Journal of Futures Markets, Vol. 14, No. 1, 103-109 (1994).

Ward, Ronald and Robert Behr, "Allocating Nonreported Futures Commitments," The Journal of Futures Markets, Vol. 3, No. 4, pp. 393-401, 1983.

Williams, Jeffery, *The Economic function of futures markets*, Cambridge University Press, 1986.

Williams, Jeffery and Brian Wright, *Storage and commodity markets*, Cambridge University Press, 1991.

Working, Holbrook, "Speculation on Hedging Markets," Food Research Institute Studies, Vol. I, No. 2.

Yoo, Jisoo and G.S. Maddala, "Risk Premia and Price Volatility in Futures Markets," The Journal of Futures Markets, Vol. 11, No. 2, 165-177 (1991).

Zaremba, "Technology in Search of a Buck," Neural Network PC Tools, edited by Russell C. Eberhart and Roy W. Dobbins, Academic Press Inc., New York, NY., 1991.