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RETURNS TO INDIVIDUAL TRADERS OF FUTURES: AGGREGATE RESULTS

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ABSTRACT

The daily trading performance of over 4500 large traders in nine futures markets over a 4-1/2 year period is examined to ascertain whether traders are earning returns for risk-bearing. The results show that large commercial (hedging) traders are the most successful participants, failing to dominate only in the cattle markets. Even so, the cross-market results for the commercial and non-commercial trader groups indicate that profits, for the most part, are not significantly different from zero. It is also shown that the empirical results in this paper differ systematically from the previous studies which used month-end data. Overall, the results are inconsistent with the theory of normal backwardation and other related hedging pressure theories. Instead of focusing on the risk-return trade-off, it is suggested that the factors determining the returns to traders are likely to include stochastic processes (luck), differential forecasting ability, or market power. It appears when comparing data using month-end observations to those using daily observations that commercial traders possess short term forecasting ability, while speculators have long term forecasting ability.

SECTION I — INTRODUCTION

The factors that determine the relative performance of an individual firm or laborer have always been of great interest to economists. Elements such as luck, superior skill, market power and the inherent risks involved in transactions or production are those most frequently discussed and analyzed. In general, one might expect that the same factors that account for the success or failure of an individual or a firm in a real goods or service market would also be present in a speculative market. In speculative markets, however, financial economists have mostly focused on the risk-return trade-off. Speculators are assumed to receive payments for their willingness to bear the risks other traders wish to avoid. There is little discussion about the returns traders earn due to forecasting skills, market power or luck. This narrow focus, especially in most empirical work, has assumed away many interesting and relevant problems. This paper will present evidence which indicates that the emphasis on risk bearing as the major determinant of trader performance in modern futures markets is misplaced.

In this paper the returns to participants in futures markets are analyzed in greater detail than has been previously possible. The empirical evidence suggests that the established theories that attempt to explain trader profits as a function of the risks the traders are willing to absorb are inappropriate (Blau 1944; Cootner 1960; Hicks 1978; Kaldor 1939; Keynes 1930). Specifically, this paper shows that the theory of normal backwardation, with its straight-forward predictions of who wins and who loses, does not have empirical support in modern futures markets. Instead, theories that explain the profits earned by individuals as a function of luck, superior forecasting ability or market power (i.e., the ability to distort the price determination process) appear as important, if not more descriptive.

In this paper the performance of over 4500 individual large traders of futures is described in detail. These large traders are individuals or firms whose contract holdings exceed fixed reporting levels.[1] Nine markets over a 4-1/2 year period are analyzed using the Commodity Futures Trading Commission's (CFTC) confidential reports on the daily transactions of these traders. From this information a day to day trading history was compiled for each participant. The overall results for the nine markets studied show that the most profitable traders are the large commercial (hedging) traders, who account for 85% (or $728 million) of the total net profits of $853 million earned by all of the large traders in this period. Gross gains earned by all successful large traders total $1845.97 million, while gross losses of the unsuccessful large traders total $991.58 million. Even though gains outweigh losses by a considerable margin in all nine markets, statistical tests are often unable to show that traders earn profits that differ significantly from zero.

When comparing the results from the detailed daily data used in this study to the findings in the two previous studies (Houthakker 1957; Rockwell 1964, 1977) that used month-end observations, two main points emerge. First, the results in these earlier studies are systematically biased. When using the less refined month-end data the returns to commercial traders are understated and the returns to non-commercial traders are overstated. This observation suggests that the commercial traders have short-term forecasting ability while they lose over the longer term. On the other hand, non-commercial traders lose on their short term transactions, but appear to have the ability to predict long term trends. Second, when the Houthakker and Rockwell methods are applied to month-end data over the period of analysis for this paper, the results are quite similar to those from the past. Therefore,

it appears as if the results in this paper are consistent with those from other time periods.

Positive net profits are earned by the large traders in aggregate; however, most traders (53%) lose on their transactions. This result is not surprising since the distribution of individual returns is positively skewed. The skewness coefficient for the distribution of returns for all large traders is 30.19. In addition, the five most successful traders (0.1% of the sample) alone earn 58% (or $492 million) of the net profits earned by all large traders or 27% of the gross gains earned by all traders earning positive dollar returns. This skewness is observed in all nine markets, as the mean skewness coefficient is 8.49.

The commercial traders earn the largest share of profitseven though they are the participants supposedly willing to pay to offset their cash market risks. The question then arises as to what factors might account for their success. The large commercial traders are those futures market participants whose type of business is most closely related to the market for the underlying commodity or asset for which the futures contract is written. They are importers, exporters, processors, distributors, inventory holders, government securities dealers and other financial intermediaries. Because of the nature of their business it is likely that these participants are well informed about market conditions. In addition, they may also be privy to more accurate and timely information than other traders; in fact, their position may be comparable to that of a corporate insider. Their ability to earn returns (or maybe even rents) from private information would appear to have a sound theoretical basis.

Alternatively, if returns are determined solely by a stochastic process then the size of the individual gains and losses would be a function of the

trader's position size. Since the reporting commercial traders hold the largest positions one would expect that these traders would be the biggest winners, as well as the biggest losers. If, in aggregate, the positions of these large commercial traders were not equally balanced (i.e., the same number of long and short holdings) then period specific price movements might account for the profits of the group. For example, if these traders are net long over a period of unanticipated inflation then they would earn positive returns simply for being on the right side at the right time.

Another explanation of why certain traders are successful relates to market power or the power to distort the market price (Hartzmark 1984, 1986b). Given the size of the positions held by the larger commercial traders and the magnitude of the transactions they make, it is also possible that this group of traders might possess market power or the ability to induce substantial price level movements. In other words, their trading may lead to small price bubbles or overshoots. This action would then result in profitable opportunities for the large commercial traders if there were enough naive traders ready to flow into the market and continually take losses.

Qualifications and Explanations

Before beginning the analysis, three very important points specific to futures markets and the methodology used in this paper should be understood. First, measuring a percentage rate of return to futures trading has little meaning. There are two reasons for this. The net supply of contracts in futures markets is zero. For every long position, there is someone with an offsetting short position. Therefore there is no meaningful way to determine the magnitude of total investment in the market (the denominator for any percentage rate of return). In addition, and closely related, this market represents a zero sum game where for each dollar lost there is a dollar

gained. In fact, the daily mark-to-the-market system credits all winners and debits all losers. In theory this sets the value of each contract to zero at the end of each trading session. In addition, one only need post a small performance margin to participate in the market. These funds can take the form of an interest bearing note, where the customer accrues the interest payments. In other words, the opportunity cost of investing is quite small (Telser 1981; Hartzmark, 1986a). Given all of these features of the futures market there is no consensus on just how to measure a percentage rate of return.[2] One might want to use the level of processing, transactions and information accumulation costs incurred by the trader as a measure of investment. However, measuring these for each individual is impossible. Therefore, in this paper the returns to traders are measured in dollar terms.

Second, given the limitations of the data, this study can only be partial equilibrium in nature. Only the futures positions held by these traders can be observed. Unless one were able to individually poll all the traders, it would be impossible to collect the necessary information to determine what other assets or commodities comprise the portfolios of these individuals, partnerships or firms. It may be that losses in the futures market are offset by gains in other markets or in consumption. Or, it may be that speculators in these markets are actually cross-hedgers attempting to offset some of their overall portfolio or consumption risk and thus willing to absorb losses. Even so, when working with individuals who obviously hold varied portfolios it is as arbitrary to assume that they hold the market portfolio, as it is to assume that they hold no other assets at all.

It must be added that there is no widely accepted general equilibrium framework with which to measure the excess rate of return on a futures position. There is not even a consensus on the composition of the relevant

market portfolio or consumption basket used in financial studies. Because of these deficiencies, an acceptable method of estimating beta or systematic risk in futures markets has yet to be developed. Many have made an attempt, yet given the author's assumptions it is possible to estimate any magnitude or sign of beta. Dusak (1973) estimated zero betas. Bodie and Rosansky (1980) estimated betas for individual commodities that were not significantly different from zero, although when the data were pooled, negative betas were observed. Carter, Rausser and Schmitz (1983) estimated large positive betas, although their methodology was questioned by Marcus (1984). Because of these unresolved questions and the focus of this paper on the risk premium and normal backwardation in futures markets, a partial equilibrium framework will be used.

Finally, the distinction between commercial and non-commercial traders within a particular market is not always clear-cut. Certain commercial traders will speculate or trade on their individual price expectations. In fact, as we shall see in later sections this speculative activity by commercial traders appears to be a major characteristic of these markets. These traders enter the futures market or alter their futures positions both when they consider themselves to have an uncertain opportunity to profit (i.e., speculate), as well as a need to hedge (i.e., reduce their price risks). At times they will be fully hedged, at other times they will only be partially hedged, and at certain times they may be overhedged. In any case, as we shall see below, their demand for futures contracts will be composed of both a speculative and a hedge component.

SECTION II — IS THERE A RISK PREMIUM IMPLICIT IN THE FUTURES PRICE?

Observing the returns to traders in speculative markets, more specifically futures markets, has been of interest to economists for many years. Researchers have attempted to determine whether there is a risk premium implicit in the futures price and thus whether the returns to traders are a function of the risks they are willing to absorb. This premium represents a payment to speculators for absorbing commercial risks. By calculating the profits of commercial and non-commercial traders one can determine whether this theory makes sense.

It has been posited that implicit in a futures price is a risk premium (Blau 1944-45; Cootner 1960; Hicks 1978; Houthakker 1957; Kaldor 1939; Keynes 1930). One of the earliest and most popular theories describing the role of the futures market as a risk reallocator is the theory of normal backwardation (Keynes 1930). In this theory, a homogeneous group of hedgers who have cash commitments attempt to reduce the risk of adverse cash price movements by taking offsetting futures positions. For this service they are willing to pay a risk premium to a homogeneous group of speculators who absorb the price risk. Thus, the implication of this theory for the distribution of profits is clear; on average the speculators earn profits by following a naive investment strategy consisting of taking positions opposite those taken by the hedgers. The hedgers then lose money on their futures market transactions, but are able to reduce their business risks.

The anonymous mechanism which facilitates the transfer of money from the hedgers to the speculators consists of systematic contract price movements. When the hedgers are net short (long) the contract price approaches the realized future spot price from below (above) as the contract matures. For this type of systematic price movement to occur on average, it is necessary

that at any point in time prior to contract maturity the futures price is downward (upward) biased when the speculators are net long (short). In general, the major assumptions that traders have homogeneous price and profit expectations are present in the early theories as well as many contemporary theories. Therefore, the models do not allow for traders with differing forecasting abilities. By decomposing the returns earned by commercial and non-commercial traders we shall be able to indirectly determine the likelihood that speculators receive positive returns for absorbing risks.

To understand this problem consider trader i's demand for futures contracts (holding his cash position constant) derived from a very simple two period expected utility framework (Hartzmark 1984,1986a). If the individual maximizes expected utility where utility is a function of expected wealth and the variance of wealth (i.e., quadratic) we get the demand for futures by individual i as:

$$(1) \quad F_i = \frac{[E_{io}(p_1) - p_o]}{A_i v_{fi}} - \frac{[Y_i v_{sfi}]}{v_{fi}}$$

where,

F_i = quantity of futures contracts to be purchased ($F_i > 0$) or sold ($F_i < 0$) in period 0 and offset in period 1;

Y_i = the amount of the commodity or asset which the individual commits in period 0 to be bought ($Y_i < 0$) or sold ($Y_i < 0$) in period 1 (assumed fixed in this example);

$E_{io}(p_1)$ = the price expected in period 1 of a maturing futures contract purchased or sold in period 0;

p_o = the price in period 0 of a futures contract maturing in period 1.

A_i = the risk parameter of individual i:

($A_i > 0$ implies risk aversion)

v_{fi} = the variance of individual i's prediction error of the maturing futures price;

v_{sfi} = the covariance of individual i's prediction errors of the maturing futures price and the period 1 spot price.

For the speculator or non-commercial trader the value of Y_i equals zero in the equation above. This could be because the cost of entering into the cash market is prohibitively expensive. What equation (1) shows is that the speculator enters the market only when p_o and $E_{io}(p_1)$ differ.

For the commercial trader, or a trader who has a nonzero Y_i, the demand for futures consists of two elements, a speculative and a hedge component. If commercial traders have no forecasting ability (i.e., $E_{io}(p_1) = p_o$) and there are stable relationships between cash and futures prices, commercial futures activity will be linearly related to cash market activity (i.e., pure hedging). On the other hand, the activity of commercial traders who possess divergent price expectations will include some speculation. For example, even if $Y_i > 0$ and $v_{sfi} > 0$ the commercial trader may take a long futures position ($F_i > 0$) if $E_{io}(p_1) > p_o$ by a significant amount. We can see from equation (1) that even when examining traders in one market the decomposition of traders into commercial and non-commercial categories can be somewhat arbitrary, as there will be a subset of traders who have both speculative and hedge components of their demands for futures.

We can extend the analysis and show the magnitude of the risk premium by assuming that the market must clear and that all traders are homogeneous.

Market clearing implies:

$$(2) \qquad \sum_{i=1}^{s+h} F_i = 0 \qquad i=1,2....s+h \text{ traders; with s speculators and h hedgers.}$$

Trader homogeneity implies that $E_{io}(p_1)$, v_{fi} and v_{sfi} are the same for all the s+h traders and Y_i is the same for all h hedgers. Thus, we can drop the subscript i and substitute equation (1) into equation (2) to get:

$$(3) \quad 0 = s \cdot \frac{[E_o(p_1) - p_o]}{Av_f} + h \cdot \frac{[E_o(p_1) - p_o]}{Av_f} - h \cdot \frac{[Yv_{sf}]}{v_f}$$

We then get the risk premium:

$$(4) \qquad E_o(p_1) - p_o = \frac{h}{s + h} [A\ Yv_{sf}]$$

Therefore, in a market where the cash market participants are inventory holders, so that $Y > 0$, the risk premium is positive. The expected maturity futures price (or the expected spot price, if we assume the two must converge) is greater than the currently quoted futures price. Therefore, the speculators who are long in the futures market will on average realize positive returns.

This equation also describes markets where the hedgers are net long (i.e., short the cash commodity). In this case the premium is negative with the short speculators earning positive returns. In general then, given trader homogeneity and market clearing, the futures price will be a biased estimate of the future spot price or futures maturity price. The bias will be a function of the risk preferences of traders, the number of traders, their prediction abilities, and the size of the cash commitments to be hedged. Further, in this theory the speculators are predicted to be the winners in their futures market transactions. Therefore, if this theory is correct, the

mean return of speculators (risk absorbers) should be positive and the mean return of commercial traders (risk avoiders) should be negative.

If the pool of actual or potential speculators is large enough and the costs of entry and exit are small enough, then the risk premium assumed to exist in the risk reallocation theories of futures trading may be bid to zero (Telser 1967). One could also say that in this case the supply of speculative services is infinite. If the number of speculators (s) in equation (4) goes to infinity, then the risk premium will be bid to zero. Once the risk premium disappears and we allow for trader heterogeneity the success of the traders will depend upon whether they are luckier than average, possess superior forecasting skills or have the ability to deceptively move the market price.[3] This paper will not attempt to determine which of these alternative explanations is best in describing the distribution of trader returns. The paper does show, however, that one or all of them must be important since the risk premium story is not supported.

SECTION III -- PAST RESEARCH ON TRADER PROFITABILITY

There have been several empirical studies on trader profitability in futures markets. Some studies have used customer accounts from a single firm (Hieronymus 1977; Stewart 1949; Teweles, Harlow and Stone 1977). Other research (Houthakker 1957; Rockwell 1964,1977; Chang 1985) has been based on the figures presented in "The Commitments of [Large] Traders In Commodity Futures" which are released monthly by the Commodity Futures Trading Commission (CFTC) and prior to this organization, the Commodity Exchange Authority (CEA).[4] The large trader database used to generate these month-end reports is the source for the empirical analysis presented in this paper. In contrast with these other papers this study uses daily data that is disaggregated to the level of the individual trader.

The studies of trader profits using samples of small speculators have all come to the same conclusion: most small traders lose money. Stewart (1949) analyzed 8,922 accounts that traded in grain futures over the 1924-1932 period and observed that 6,598 accounts or 75% of his sample lost money net of commissions. Hieronymus (1977) found that, for the calendar year 1969, that only 35% of the 462 customer accounts of a major brokerage firm were in the black. Teweles, Harlow and Stone (1977) examined customer accounts from a single firm over a ten year period and found that in a typical year 74% of the traders would lose money. Overall then, it does not appear as if the small trader fares particularly well in these speculative markets.

Studies On the Profitability of Large Traders

Houthakker (1957) and Rockwell (1964,1977) have calculated and analyzed the profits earned by large reporting traders. Their studies were completed using information from the "Commitments of Traders in Commodity Futures". This publication contains information on aggregate positions of all large traders for the last trading day of each month. These studies analyzed the performance of reporting (or large) traders for the first time. This group represents the dominant (in terms of market share) subset of traders. Additionally, one might assume that this group would most likely include those individuals who had the best private information sets.

Houthakker analyzed the corn, wheat and cotton futures markets for the period 1937-1952 (with corn and wheat excluded between 1940-1946).[5] Overall, Houthakker observed that the big winners were the large speculators, while the big losers were the large hedgers. This is consistent with the theory of normal backwardation. Through some statistical tests Houthakker was also able to conclude that large speculators possessed special forecasting skill, or the ability to continuously adjust one's position in an attempt to profit from short term price movements.

Rockwell (1964, 1977) analyzed a much larger sample of month-end reports, employing a similar technique as that used by Houthakker (see footnote 5). Rockwell collected over 7,900 observations on 25 commodities for the period of 1947-1965. He was not only able to calculate returns to positions held, but also to infer some cross-sectional patterns.

Overall, Rockwell found that in aggregate small traders earned almost nothing, actually realizing a slight loss of $3.4 million. Large speculators earned positive returns totaling $178.8 million. Large hedgers earned negative returns, although most of the losses came in the soybean market (one of the three markets that he defined as being large). Rockwell found evidence of forecasting ability for both large speculators and hedgers. Rockwell attributed the losses of the hedgers to normal backwardation in the three larger markets. Rockwell concluded however, that, "Normal backwardation is not a characteristic of the 23 smaller markets either when hedgers are net long or net short; and it is characteristic of the three larger markets only when hedgers are net short."

A recent article by Chang (1985) examined the wheat, corn and soybean markets from 1951-1980 using the monthly large trader reports. He concluded that risk payments from large hedgers to large speculators were far larger in magnitude and importance than found by Houthakker and Rockwell.[6] This result was most prominent in the sub-period of 1973-1980.[7]

SECTION IV — DESCRIPTION OF THE DATABASE

The major portion of the data which is used to make the profit calculations in this paper come from two sources. The daily settlement prices and market activity variables come from the CFTC permanent files. The information on the individual large traders is generated from the CFTC's

reports on the end of day commitments of large traders. In all markets traders who, at either the beginning or the end of a trading day, hold commitments exceeding certain levels (e.g., at least 100 Treasury Bond contracts) are required by the CFTC to report their trading activity with their speculative and hedge, long and short positions in all contract maturity months.[8]

Obviously, this dataset does not include the positions of day traders or scalpers. In addition, the intra-day profits and losses earned by large traders cannot be calculated. Daily profits for each trader for each contract that is held are calculated by taking the end-of-day positions and multiplying them by the change in the settlement price between the current day and the following day. In essence, daily profits are calculated in the same manner that the central clearinghouse marks each trader to the market price.

The empirical analysis covers nine markets over the period July 1, 1977 to December 31, 1981.[9] The contract markets are:

1) Oats traded on the Chicago Board of Trade (CBT)
2) Wheat traded on the CBT
3) Wheat traded on the Minneapolis Grain Exchange (MGE)
4) Wheat traded on the Kansas City Board of Trade (KBT)
5) Pork Bellies traded on the Chicago Mercantile Exchange (CME)
6) Live Cattle traded on the CME
7) Feeder Cattle traded on the CME
8) U.S. T-Bonds traded on the CBT
9) 90 day T-Bills traded on the International Monetary Market (IMM)

There are close to 1.3 million observations in the database on transactions that were either reported or assumed to have taken place.[10] After aggregating each traders' observed daily position across all maturity months there are 585,580 observations. In total there are 4,567 separate trading entities representing 4,370 different individuals or firms.[11]

To determine whether a trader is a commercial or a non-commercial trader a naive strategy is employed. All traders who reported only hedging positions

are considered to be commercial traders (or pure hedgers). All traders who reported only speculative positions are considered non-commercial traders (or pure speculators). For those traders who reported both hedge and speculative positions (a small group) the confidential files kept by the CFTC are used to determine the line of business of the traders.[12]

SECTION V — THE OVERALL PERFORMANCE OF LARGE TRADERS

In this section the overall performance of over 4,500 large traders is examined. The emphasis is on the aggregate results for the two different groups of traders: large commercial and non-commercial traders. Additionally, profit calculations using the day-end reports are compared to profits derived using the publicly available month-end reports of traders. As mentioned before, the measure of return that is consistently used throughout this paper is the dollars earned by each trader. In addition to the reasons offered before, this measure corresponds most closely to that chosen by the authors of earlier studies.

Performance By Trader Groups

Table 1 clearly shows that large traders earned substantial dollar returns over the July 1977 to December 1981 period. Commercial traders earned a large proportion of aggregate net profits, accounting for $728.32 million of the $853.00 million earned by all large traders. Only in the live cattle market did commercial traders as a group fail to earn positive dollar returns. The two new financial markets proved to be the most profitable markets for commercial traders, although most of their money was made after October 1979.[12] In these markets the combined earnings totaled $674.05 million.

<<INSERT TABLE 1 HERE>>

Even though profits seem to be positive, when using t-tests to examine differences in means, it does not appear that the profits are significantly different from zero at the 95 percent level. The results of the two t-tests that are noted in Table 1 indicate: 1) whether the mean of the distribution of individual returns is different from zero (i.e., each individual's performance is taken as a separate observation); and 2) whether the mean of the distribution of monthly aggregate returns is different from zero (i.e., the combined performance of all traders in each sub-group for each month is used as a separate observation).[14] Only in the pork bellies, live cattle and T-Bond markets did the commercial traders earn returns that are significantly different from zero.

In the nine markets combined the non-commercial traders earned $124.60 million. Non-commercial traders earn negative dollar returns in three of the nine markets (i.e., MGE Wheat, KBT wheat, and T-Bonds). As one might expect, the non-commercial traders are the most successful in the live cattle market, or the market where commercial traders perform the worst. However, for this group of traders, mean individual and monthly returns are significantly different from zero in only the live cattle, feeder cattle and T-Bond markets.

Small traders (or those who are not large enough to report) are the big losers, losing a total of $853 million.[15] There are no individual position values for these traders, therefore these profit results are simply the residual returns. They are calculated by setting total profits for all traders combined to zero.

As a group, large traders perform much better when they are net short than when they are net long. This is shown under the NET LONG and NET SHORT columns in Table 1. Large traders earn negative returns in six markets on their net long positions, with combined long losses across all nine markets of

$991.58 million. The two financial futures markets dominate these results. Without them, net long losses turn into gains of $168.59 million. When large traders are net short they do much better, earning positive dollar returns in seven markets with a combined total of $1,845.97 million across all nine markets. Again however, the financial markets dominate the net short results. Excluding the financial markets reduces net short profits to $174.15 million. Commercial traders lose in five markets on their net long positions and in only two markets on their net short positions. Non-commercial traders lose in seven markets when they are net long and in only one market when they are net short.

A ratio of long losses to short gains is constructed to determine the balance between losses and gains in all nine markets. The lower this ratio the more dominant the gains are relative to the losses. One observes that the value of the commercial traders' combined long losses to combined short gains is 31.76% (=339.07/1067.59). For the non-commercial traders this ratio is 83.83% (=652.51/778.38). Removing the two financial futures markets does not radically alter the percentage of losses to gains for commercial traders. However, with the removal of the financial markets from the calculations for the non-commercial traders, aggregate losses on net long positions are turned into aggregate gains and the ratio goes to zero.

Gross dollar returns are also presented in Table 1. To calculate these values the returns of all traders who lose money are summed to get TOTAL LOSSES and the returns to all traders who earn positive profits are summed to get TOTAL GAINS. Overall, for commercial traders aggregate gains are twice as large as aggregate losses. For the non-commercial traders, aggregate losses and gains are almost equivalent. The commercial traders ratio of gains to losses is highest in the pork bellies, T-Bond and T-Bill markets. For non-

commercial traders the ratio is highest in the two cattle markets. In all cases, except for the successful commercial traders of oats, these gross gains and losses are significantly different from zero at the 95% level. In fact for 32 of the 36 distributions of commercial and non-commercial individual returns decomposed by winners and losers, the mean return is significantly different from zero at the 99% level. Therefore, even though there are many traders who gain and lose only a few dollars, one can conclude that on the whole the winners earn substantial positive profits and the losers realize very large losses. What factors determine the differential performances is left to future research.

One can measure an alternative dollar return by adjusting the total dollar returns for the total length of time a trader in the group remains in the market. To calculate this measure the total dollars earned by each group are divided by the aggregate number of days spent in the market by all traders in that group. On average and in aggregate, large commercial traders are in the market longer than non-commercial traders (see Hartzmark 1984, Table 4). Even after the adjustment for differences in trading duration is made, commercial traders outperform non-commercial traders in seven markets. For commercial traders the average daily dollar returns range from a negative $1,573.88 per day (live cattle) to a positive $1,052.27 per day (T-Bonds). For non-commercial traders the range is from -$232.04 per day (MGE wheat) to $1,303.36 per day (feeder cattle).

Overall, only 47% of all the large traders in the sample earn positive dollar returns.[16] If commissions were subtracted, this proportion would be even lower. The non-commercial traders who face larger commissions per transaction (because they would be less likely to hold exchange memberships) would probably be affected to a greater degree. The percentage of successful

traders varies across markets. The proportion of successful traders to total traders in any one market ranges from 43.9% (live cattle) to 58.5% (pork bellies) for commercial traders and from 42.4% (T-Bills) to 57.1% (MGE wheat) for non-commercial traders. Overall, these proportions appear very low given that the group of large traders is composed mostly of professional traders. However, the low proportion of winners in this group is consistent with the observed results for the very small traders where the proportion of losers is estimated to be anywhere from 65% to 90%.

Generally, the big winners are the large commercial traders. They did best in the financial markets where one might expect that they would have a distinct advantage given the immaturity of that market and the specialized knowledge that they possess. When compared to the non-commercial traders, the commercial traders earn a much larger proportion of gains to losses. This is true whether one examines the long versus short gains and losses or the aggregate gains and losses. For both groups of traders the short side of the market proved to be the profitable side. This means that the group composed of both large and small speculators lost money when net long. This is contrary to what one might expect to find if speculators are earning returns for bearing risks, while hedgers are net short. Finally, the markets where the commercial traders perform poorly and the non-commercial traders perform best are the cattle markets. These markets with their non-storeable and transformable products have been observed to perform differently from most other futures markets (Helmuth 1981; Commodity Futures Trading Commission 1985), and here again they stand out.

Examination of Returns For Traders With Both Speculative and Hedge Positions

As shown in equation (1) certain traders will hold both hedge and speculative positions. Traders who carryout both types of trading might be considered to be the most sophisticated of all traders. Therefore, the returns to traders are also decomposed into sub-categories depending on whether the individual trader reveals only speculative or hedge positions or whether he reveals both types of positions. This decomposition is presented in Table 2. Note, that this does not break down the returns these traders earn on their individual speculative and hedge positions.

<<INSERT TABLE 2 HERE>>

In Table 2 it is clear that the traders who hold both speculative and hedge positions earn 77% of the total net profits earned by all traders in all markets. Only in the KBT wheat market do they fail to earn positive returns. In the pork bellies and T-Bond markets they earn greater than 100% of the total net profits earned by all traders in their respective markets. Like the results in Table 1, for the most part, the dollar returns are not significantly different from zero. Only in the pork bellies, feeder cattle and T-Bond markets are statistically significant profits earned by those traders who hold both types of positions.

Of real interest is the observation that the returns to pure speculators (defined as those who hold only speculative positions), when aggregated across all nine markets, are negative, or at least insignificant. Their significantly positive returns in the cattle markets are offset by their substantial losses in the T-Bond market. The pure hedgers earn significantly positive returns in the MGE wheat, the T-Bond and T-Bill markets. Combining the returns of the pure hedgers with those traders who hold both types of positions indicates that those traders who do some hedging earn most of, if

not more than, the total net profits realized in each of the markets. The cattle markets are the only exception.

This table provides further evidence that the risk premium hypothesis is inadequate in explaining the determinants of trader profitability. Given this table (without any significance tests) one would conclude that traders who hold both speculative and hedge positions are the big winners. In addition, the commercial traders who hold both speculative and hedge positions perform exceptionally well. These traders are cash market participants who carry out a relatively small amount of speculative activity. Since it is likely that these are the most sophisticated participants in the market one might then conclude that they are earning returns on their ability, whether it be forecasting prices or moving the market price for their own advantage.

Comparison with Previous Results

The general results obtained by Houthakker (1957) and Rockwell (1964, 1977) differ in many respects from the results presented here. Overall, Houthakker and Rockwell show that large speculators or non-commercial traders are the big winners. They gain mostly at the expense of the commercial traders, with some payments from the small traders. The Houthakker and Rockwell calculations are biased, however.

There are two major differences in the previous studies that might account for the discrepancy. First, Houthakker and Rockwell calculate profits on speculative and hedge positions, not for speculative and hedge traders (see footnote 6). In this paper the positions and the profits are decomposed by type of trader, not type of position. Second, because of the month long period between their observation dates Houthakker and Rockwell are unable to account for the profits earned on the daily trading activity. Failing to account for day to day position adjustments drastically alters the results.

In Table 3 a comparison is made between profit calculations using the Houthakker and Rockwell methods (see footnote 5) over the 1977-81 period and calculations using the daily data used in Tables 1 and 2 decomposed by type of trader (denoted DAILY). The differences in the totals between DAILY in Table 3 and the results in Tables 1 and 2 emerge because a different number of months is used in the calculations.[17]

<<INSERT TABLE 3 HERE>>

When month-end data are used, non-commercial traders earn significant positive returns in five of the nine markets and for all markets combined. By contrast, the commercial traders earn significant positive returns only in the pork bellies market and significant negative returns only in the CBT wheat market. In all markets combined the commercial returns are not significantly different from zero.

Across all nine markets the Houthakker and Rockwell methods understate commercial or hedger returns and overstate non-commercial or speculator returns. In four markets the profit calculations using the month-end reports for commercial traders are negative, while the profit calculations using the detailed daily data are positive. The differences are of the opposite signs for the non-commercial calculations. For these traders, month-end calculations result in positive returns in three markets where calculated profits using daily data are negative.

There are only a few instances when the t-statistics, testing for the difference between the mean monthly return using the DAILY data and the mean returns using either the Houthakker or Rockwell method, are significant. The difference is significant when all markets are combined for the non-commercial traders. It appears that the standard errors for these distributions are large enough that, in most cases, differences cannot be shown. However, the

probability that the observed systematic biases would result in each of the nine markets by simple chance is quite small.

The results derived using the Houthakker and Rockwell methods are fairly consistent with the pattern that the two authors observe for their samples over their time periods. Employing their methods over the more current period and in the chosen markets shows that the big winners are the non-commercial or speculative traders (or speculative positions). The big losers are the small traders. These results are similar to those Rockwell found for his sample of small markets (a category for which all nine markets except for T-Bonds would fall into). In the sub-sample of small markets Rockwell found that commercial traders earned almost nothing (here they have lost very little in aggregate) and the small traders were the big losers (as they are here). These results are also consistent with Houthakker's findings in the corn and wheat markets and in the peace time period in the cotton market. Fortunately then, it does not appear that the results in this paper, which have been derived using the daily database over a more current period and in different markets, are subject to the objection that they are period or market specific.

Also presented in Table 3 are calculations of trader profits using the month-end commitments of commercial and non-commercial traders taken from the daily database constructed for this study. To derive this commitment measure, the daily commitments of all traders are carried forward (when necessary) to the last trading day of each month. Using Rockwell's method of calculating profits, these monthly observations are used instead of the month-end commitments published by the CFTC. These newly derived commitments are decomposed by trader type, not trader position, and are thus denoted TYPE. Because of the substantial costs associated with generating these results only four markets were analyzed.

The returns using the month-end commitments from the daily database broken down by trader type do not differ significantly from the profits calculated using the CFTC month-end commitments broken down by trader position. Only in the feeder cattle market for commercial traders is there a difference in the signs (but not significance) of the aggregate profits. One can conclude then that the commercial traders report mostly hedge positions and the non-commercial traders report mostly speculative positions. It does not appear that hedgers holding speculative positions or speculators holding hedge positions account for much of the discrepancy between the DAILY results, which are broken down by trader types, and the HOUTHAKKER and ROCKWELL calculations, which are broken down by trader position.

What these comparisons do strongly indicate is that the results using the publicly available month-end reports are misleading. Using day-end observations drastically alters the profit calculations. This is not very hard to believe since the use of daily data makes for a far more detailed and extensive sample. These results also indicate that non-commercial traders have long run forecasting skills, but lose a great deal on their day to day trading. On the other hand, commercial traders lose on their long term commitments (maybe due to hedging operations where losses are made up in the cash market), but earn large positive returns on their day to day adjustments or short term forecasting skills. One would think that these commercial traders with their hands on knowledge of the markets would be better able to determine when short term price distortions arise.

These calculations using the month-end commitments also indicate that, for the most part, when using statistical tests (which Houthakker and Rockwell did not use) the returns to traders are not significantly different from zero. This corresponds with the aggregate results and tests presented in Tables 1

and 2. The evidence again suggests that the risk premium hypothesis cannot be supported using profit data, whether it be month-end or day-end.

SECTION VI — CONCLUSIONS

In this paper empirical evidence is presented indicating that there is little, if any, relationship between the level of risk that a trader absorbs and the returns that that trader earns. The evidence suggests that the returns to traders are the result of either superior forecasting skill, luck or market power. Further research will have to be done before any definitive conclusions can be made as to why certain traders win and others lose.

There is some weak evidence presented that seems to indicate that certain traders may be earning positive profits from their forecasting ability. First, it is shown that the big winners are the large commercial traders, especially those who carried out some speculative activity. This group of participants would most likely have access to more timely and precise information, and thus would be able to profit from it. Second, it is shown that the day-end and month-end results are systematically biased and often significantly different. The most reasonable explanation would suggest that this is due to differences in long and short term forecasting abilities of the different trader groups. And third, the distributions of trader returns are highly skewed, with the skewness coefficient for all traders combined of 30.19 and the average across all nine markets of 8.49. One might expect that in an information market a high proportion of returns for information will go to a very few participants who have pertinent and timely facts. The rest of the participants will miss the boat and be trading on information already reflected in the market price.

What does the empirical evidence in this paper suggest about the role and function of the futures market? First, there is not any support for the theories that suggest that there is a systematic risk premium implicit in futures prices. If this were the case, the commercial traders would not have performed as well since they would have been paying the non-commercial traders. Additionally, we would have expected large and small speculators as a group to earn significantly positive profits.

Does this mean that these markets are not hedging markets? Certainly not. This says that hedging can be carried out without paying a risk premium. There are enough individuals who are willing to enter these markets and absorb risks such that the risk premium is bid to zero. In addition, the fact that traders engage in trade because of differing expectations of future price levels leads one to conclude that the differences in expectations swamp the risk premium in the price determination process (Hartzmark 1984).

Second, the empirical results suggest that a major role of these markets is that of an information intermediary, aggregating and transmitting information to the economy. Commercial traders certainly enter these markets to reduce their risks, however, they are just as likely to enter the market in an attempt to earn a return on their private information. Therefore, attention must be focused on how well these markets efficiently transmit new information. The incentives and disincentives encouraging well-informed traders to enter the market must also be investigated.

There are two other interesting implications which emerge from the results presented in this paper. First, since it does not appear as if speculative traders are receiving compensation for the risks that they absorb we should ask: Why do rational individuals enter the market? At issue are the ways economists model individual economic behavior. Speculators may trade

even when average ex post profits are nonpositive for one of the following reasons: 1) positive nonpecuniary benefits received from participating in the market (i.e., they love to gamble); 2) continual errors in estimating the true price distributions (naive traders go bankrupt and leave the market before learning takes place only to be replaced by other naive traders); 3) the small probability of earning a great deal of money while limiting losses through stop-loss orders (this scenario is similar to that presented by Friedman and Savage (1948) explaining why people simultaneously purchase insurance and participate in "unfair" lotteries); 4) the desire to reduce portfolio risk; 5) a willingness to pay for the learning that goes on when one trades; and 5) institutional rules (e.g., tax laws) allow them to increase their wealth. Even so, the fact that speculators continually lose makes one question whether the normal theoretical assumptions of individual risk aversion and rational behavior are correct.

A second point of interest relates to the risk premium supposedly implicit in the market price. Since it does not appear that this risk premium exists, researchers must be aware that any statistical inefficiencies that are observed in the futures market should not be attributed to the risk premium. Other explanations such as transactions cost (Williams 1985) or market power (Hartzmark 1986b) do remain possible explanations.

Overall then, it appears as if speculators in futures markets do not earn significant positive returns. From this we can infer that it is unlikely that there is a risk premium implicit in the futures price for a commodity. What we do not know is why certain traders are profitable and others are losers. This issue deserves further attention since it is obvious that we must look beyond risk for the answer.

FOOTNOTES

[1]Large traders are futures market participants who hold positions in excess of a given level. The level is specified by the CFTC. For example, during the period of study for this paper, traders who held more than 40 contracts in oats futures (in any or all maturity month combined) had to report their daily transactions to the CFTC .

[2]In addition, when using data disaggregated to the individual level one can get very misleading results using percentage rates of return. For example, the trader who holds a short position worth $1 and a long position worth $1 could conceivably earn an infinitely positive or negative return on his net investment (i.e., zero dollars) if there is any change in the relative prices of the contracts. Even more, it seems inappropriate to suggest that the total investment is $2 in this case.

[3]All of these theories are discussed in great detail in Hartzmark (1984).

[4]Before 1974 the regulatory agency overseeing futures activity was the Commodity Exchange Authority housed within the Department of Agriculture. After 1974 an independent regulatory agency, the Commodity Futures Trading Commission (CFTC) was set up.

[5]Houthakker (1957) and Rockwell (1964,1977) used slightly different procedures to calculate profits of traders. In general, they assumed that the total number of contracts held by large traders was distributed across maturity months in the same way that open interest was distributed across maturity months. They then assumed that contracts in each maturity month were purchased at a given price (e.g., the closing price on the date of observation or the average of closing prices over the month the observation was for). They then assumed that the contracts were offset at a corresponding price the next month. From this change in price profits were calculated for each maturity month, each month.

[6]The interpretations by the three authors who used the month-end reports are correct only if speculators report only speculative positions and hedgers report only hedge positions. Since the monthly publications report the speculative and hedge positions held by all traders, the "speculative" category includes both speculators and hedgers holding speculative positions, while the "hedging" category also includes reported positions of both speculators and hedgers. Therefore hedger and speculator positions may overlap. What Houthakker, Rockwell and Chang actually discovered was that in aggregate, hedgers and speculators lost on their hedge positions and won on their speculative positions. This overlap problem does not appear to be important as is shown in section IV.

[7]Given the nature of the tests that Chang employed one cannot determine whether one gets these results because of a change in the general market conditions, a change in the reporting requirements, a change in the proportion of traders who must report, unanticipated price inflation over this period, or an increase in the magnitude of the risk premium.

[8]Actual fixed reporting levels and a detailed description of the large trader database are given in Hartzmark (1984) and McDonnell and Freund (1983). Note that reporting requirements change at infrequent intervals. During the period of study, there was one change in each of the wheat, live cattle, T-Bonds and T-Bills markets. The effects of these were minimal.

[9]For two of the markets a different period was analyzed. Data for oats ran from January 1, 1978 to December 31, 1980 and those for T-Bonds ran from August 22, 1977 to December 31, 1981.

[10]Various modifications were made to the original dataset. Traders with contracts outstanding were assumed to have offset them all the day after their last report was made. Traders that appeared with positions that did not correspond to the volume of their trade on the first day that they reported were assumed to have purchased the difference that was unaccounted for the day before they first appeared. For a detailed explanation of the modifications and extensions see Hartzmark (1984).

[11]This difference between the number of trading entities and the number of individual traders presented certain difficulties because the discrepancy could not be explained in any systematic way. The problem relates to the way firms identify themselves. The CFTC identification codes are seven digit numbers. The first five digits represent a particular firm or individual. The last two digits represent a division or section within the firm or an alternative account for the individual. The firm or individual may report all of its accounts in one report with one seven digit code or report them separately changing only the last two digits after the five digits. It is impossible to determine whether or not the different accounts should be aggregated. For example, company X may have one number for which it uses to report its transactions in both the wheat and T-Bill markets, while company Y may report their transactions under two separate code numbers. Even if the firm uses one code number, there is no guarantee that the trading is coordinated. In the results that are reported it is assumed that trading is totally independent within the firm.

[12]Just because traders do not reveal both types of positions does not mean that they are not carrying out both hedging and speculative activity at certain times. There are incentives to misreport positions, however these appear very weak. Traders who report positions greater than the speculative limits must obtain hedge exemptions from the CFTC, and thus must report these positions as hedge positions. If a trader exceeds the limits without the exemption he faces heavy fines or maybe trade restrictions. Therefore, a trader may report only speculative positions up to the limit and then hedge positions thereafter. On the other hand, if a trader can convince the CFTC that he is a commercial participant then he may be faced with lower margin requirements, if he can also convince his broker or the clearinghouse those that take margin funds). Given that margin requirements are assumed to impose little, if any cost, it does not appear that the incentive to lie is all that great.

[13]In the period before October 1979 the commercial traders earned $1.08 million in the T-Bond market and $19.39 million in the T-Bill market. In the period including October 1979 and after, the commercial traders earned $558.01 million and $85.57 million in the T-Bond and T-Bill markets, respectively. For the non-commercial traders, in the early period they earned $10.46 million in the T-Bond market and lost $27.97 million in the T-Bill market. In the later period they lost $179.53 million in the T-Bond market and earned $33.45 million in the T-Bill market.

[14]There is a problem in determining what the appropriate tests are. First, the distributions of returns are too skewed to be considered normal. The average skewness coefficient across all nine markets is 4.48 (3.29) for commercial (non-commercial) traders. Therefore, t-tests are probably inappropriate for these distributions. However, one might expect that other tests will offer the same results. The distributions of monthly returns are fairly symmetric with skewness coefficients ranging from -1.5 to 2.3. There is a second issue as to which of the many possible distributions should be used for testing. One could conceivably use daily or yearly returns or any of a multitude of other distributions to test for significance.

[15]These non-reporting traders are usually assumed to consist mostly of small speculators (Larson 1961;Peck 1982;Rockwell 1964, 1977)

[16]This is derived by summing the total number of successful traders and dividing this by the total number of traders in the sample.

[17]Notice that because the inclusive dates for the month-end calculations (August 1977 to December 1981) differ from the inclusive dates for the previously reported results in (July 1977 to December 1981) there is a difference in the total DAILY returns for the trader groups when comparing Tables 1 and 2. To make everything comparable in terms of the periods covered several months and in the case of T-Bills and T-Bonds one year was deleted from the daily sample. That is why, for example, the DAILY commercial profits in T-Bills are $116.90 million (for 53 months) in Table 2 and $114.96 million (for 41 months) in Table 1.

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TABLE 1

PERFORMANCE MEASURES BY MARKET AND TRADER TYPE

(returns in millions of dollars)

	NET DOLLAR RETURNS				GROSS DOLLAR RETURNS		NUMBERS OF TRADERS[b]			OBSERVATIONS	
MARKET AND TRADER TYPE	TOTAL	NET LONG	NET SHORT	AVERAGE DAILY[a]	TOTAL LOSSES	TOTAL GAINS	TOTAL	POSITIVE RETURN	%POSITIVE RETURN	ON SINGLE POSITIONS	AGGREGATED DAILY
OATS											
ALL TRADERS	10.28*#	-0.85	11.14	395.37	-4.61	14.88	179	84	46.9	42925	18860
COMMERCIAL	9.63	-0.26	9.90	595.55	-1.78	11.41	50	28	56.0	24669	11321
NON-COMMERCIAL	0.64	-0.59	1.24	65.10	-2.83	3.47	129	56	43.4	18256	7539
CBT WHEAT											
ALL TRADERS	59.14	-117.72	176.85	319.58	-213.00	272.14	703	344	48.9	156628	79982
COMMERCIAL	42.94	-78.54	121.48	414.05	-137.41	180.35	236	112	47.9	81253	44518
NON-COMMERCIAL	16.19	-39.18	55.37	199.02	-75.59	91.79	467	230	49.3	75375	35464
MGE WHEAT											
ALL TRADERS	19.01	15.43	3.58	326.34	-25.06	44.06	164	90	54.9	43180	24088
COMMERCIAL	21.17	19.03	2.14	432.92	-20.00	41.17	101	54	53.5	38668	21307
NON-COMMERCIAL	-2.17	-3.60	1.44	-232.04	-5.06	2.89	63	36	57.1	4512	2781
KRT WHEAT											
ALL TRADERS	2.15	-36.45	38.72	21.10	-117.92	120.07	269	126	46.8	80398	45117
COMMERCIAL	2.62	-30.96	33.69	30.40	-105.66	108.28	172	83	48.3	67155	39053
NON-COMMERCIAL	-0.47	-5.49	5.03	-29.94	-12.26	11.80	97	43	44.3	13243	6064
COMBINED WHEAT											
ALL TRADERS	80.30	-138.74	219.15	232.62	-355.98	436.27	757	372	49.1	280206	149187
COMMERCIAL	66.73	-90.47	157.31	279.44	-263.07	329.80	270	130	48.1	187076	104878
NON-COMMERCIAL	13.53	-48.27	61.84	127.17	-92.91	106.48	487	242	49.7	93130	44309
PORK BELLIES											
ALL TRADERS	80.56*#	-51.65	132.20	489.70	-115.48	196.00	1106	550	49.7	262614	122599
COMMERCIAL	79.05*#	3.96	75.10	3697.38	-4.19	83.24	41	24	58.5	36968	14829
NON-COMMERCIAL	1.48	-55.61	57.10	10.34	-111.29	112.76	1065	526	49.4	225646	107770
LIVE CATTLE											
ALL TRADERS	66.85	250.25	-183.30	282.65	-346.11	412.96	1058	543	51.3	216053	99326
COMMERCIAL	-130.27*	24.47	-154.74	-1573.88	-232.90	102.63	238	83	34.9	63827	30989
NON-COMMERCIAL	197.12*#	225.78	-28.56	1282.13	-113.21	310.33	820	460	56.1	152226	68337
FEEDER CATTLE											
ALL TRADERS	104.55*#	109.58	-5.04	1031.13	-87.96	192.50	711	332	46.7	70064	32340
COMMERCIAL	29.13#	35.46	-6.31	669.22	-51.86	80.99	244	100	41.0	27767	11994
NON-COMMERCIAL	75.42*#	74.12	1.27	1303.36	-36.10	111.52	467	232	49.7	47297	20346
T-BONDS											
ALL TRADERS	390.02	-1012.68	1403.85	1702.22	-609.95	999.97	1713	767	44.8	225954	90541
COMMERCIAL	559.09*	-276.46	835.60	10521.27	-157.41	716.50	227	123	54.2	45586	23800
NON-COMMERCIAL	-169.07*#	-736.22	568.25	-960.71	-452.54	283.47	1486	644	43.3	180368	66741
T-BILLS											
ALL TRADERS	120.44	-147.49	267.97	614.16	-268.12	388.56	1491	656	44.0	184302	72727
COMMERCIAL	114.96*	-35.77	150.73	2276.48	-46.85	161.81	211	113	53.6	47439	21042
NON-COMMERCIAL	5.48	-111.72	117.24	37.64	-221.27	226.75	1280	543	42.2	136863	51685
ALL MARKETS											
ALL TRADERS	853.00*	-991.58	1845.97	-	-1788.21	2641.14	4567	2101	46.0	1282118	585580
COMMERCIAL	728.32*	-339.07	1067.39	-	-758.06	1486.38	971	440	45.3	428332	197433
NON-COMMERCIAL	124.60	-652.51	778.38	-	-1030.15	1154.78	3728	1725	46.3	853786	388147
SMALL TRADERS	-853.00	991.58	-1845.97	-	-	-	-	-	-	-	-

[a] In dollars.

[b] The total number of traders in ALL MARKETS does not equal the sum of all traders in each market since certain traders participate in more than one market. In addition, 132 traders were designated as being one type of trader (i.e., commercial or non-commercial) in one market and the other type in another market.

*Denotes mean of distribution of individual returns which is different from zero at a 95% probability level.

#Denotes mean of distribution of monthly returns which is different from zeri at a 90% probability level.

TABLE 2
RETURNS TO TRADERS WITH BOTH SPECULATIVE AND HEDGE POSITIONS
(in millions of dollars)

TRADER TYPE	OATS	CBT WHEAT	MGE WHEAT	KBT WHEAT	PORK BELLIES	LIVE CATTLE	FEEDER CATTLE	T-BONDS	T-BILLS	ALL MARKETS[a]
Total	10.28	59.14	19.01	2.15	80.56	66.85	104.55	390.02	120.44	853.00
Both	6.16	8.88	1.41	-2.96	92.44**	8.15	84.80**	400.21*	60.04	659.13
#Traders	(18)	(125)	(34)	(59)	(105)	(222)	(144)	(165)	(141)	-
Non-Commercial	0.01	3.84	-1.24	1.10	15.04*	86.08**	47.87**	0.25	-9.78	143.17
#Traders	(8)	(52)	(9)	(10)	(76)	(111)	(70)	(105)	(75)	-
Commercial	6.15	5.03	2.65	-4.06	77.41**	-77.92	36.94	399.96*	69.81*	515.97
#Traders	(10)	(73)	(25)	(49)	(29)	(111)	(74)	(60)	(616)	-
Pure Speculator	0.06	12.35	-0.93	-1.56	-13.61	110.94**	28.15**	-169.32**	15.23	-18.69
#Traders	(121)	(415)	(54)	(87)	(990)	(707)	(394)	(1381)	(1206)	-
Pure Hedger	3.48	37.91	18.52*	6.68	1.69	-52.25**	-8.40	159.13**	45.18**	211.94
#Traders	(40)	(163)	(76)	(123)	(11)	(129)	(173)	(167)	(144)	-

[a] Significance tests were not performed on the all markets means.
* denotes return that is different from zero at a 90% significance level.
** denotes return that is different from zero at a 95% significance level.

TABLE 3

COMPARISON OF DIFFERENT METHODS OF PROFIT CALCULATIONS
FOR AUGUST 1977 - DECEMBER 1981
(in millions of dollars)

MARKET	COMMERCIAL RETURNS				NON-COMMERCIAL RETURNS			
	HOUTHAKKER	ROCKWELL	DAILY	TYPE[c]	HOUTHAKKER	ROCKWELL	DAILY	TYPE
OATS[a]	4.02 (-1.14)	3.55 (-0.98)	9.70	---	1.72* (1.09)	1.79 (0.78)	0.65	---
CBT WHEAT	-104.69 (-2.15)	-131.92** (-2.57)	35.43	-148.15	68.67** (1.94)	77.70** (2.32)	16.10	81.68
MGE WHEAT	11.72 (-0.85)	6.34 (-1.36)	20.71	---	1.75 (1.60)	3.83 (1.56)	-2.14	---
KBT WHEAT	-9.69 (-0.46)	-3.17 (-0.20)	3.07	---	3.58 (0.48)	5.62 (0.89)	-0.53	---
TOTAL WHEAT	-102.66 (-1.71)	-128.74 (-2.01)	59.21	---	74.01* (1.79)	87.14** (2.21)	13.43	---
PORK BELLIES	50.34** (-1.08)	48.92* (-1.03)	76.78	53.92	58.29* (1.83)	54.78 (1.58)	-2.00	50.39
LIVE CATTLE	-255.47 (-0.71)	-246.87 (-0.60)	-142.45	---	305.11** (0.94)	310.13** (0.95)	197.04	---
FEEDER CATTLE	-6.54 (-2.16)	-8.91 (-2.86)	29.02	6.79	121.49** (1.09)	117.03** (1.14)	75.39	95.23
T-BILLS[b]	-9.88 (-2.36)	-9.13 (-1.96)	116.90	---	19.82 (0.57)	22.17 (0.61)	4.79	---
T-BONDS[b]	313.49 (-0.89)	301.19 (-0.68)	559.05	250.35	-34.89 (2.23)	-34.13 (1.95)	-169.39	-53.92
ALL MARKETS	-6.69 (-1.87)	-39.99 (-1.54)	708.21	---	545.54** (2.37)	558.91** (2.44)	119.91	---

[a]Results for 35 months beginning February 1978 and ending December 1980.

[b]Results for 41 months beginning August 1978.

[c]Denotes calculations using month end observations taken from the daily database used for the DAILY calculations.

T-statistics in parentheses for test of whether HOUTHAKKER or ROCKWELL MEAN Monthly return is different from mean monthly return using daily data.

*Denotes montly return is different from zero with probability 90% or greater.

**Denotes monthly return is different from zero with probability 95% or greater.