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Abstract

The performance appraisal procedures of Henriksson and Merton (1981) and Cumby and Model (1987) are applied to the returns of large speculators in futures contracts. Fewer than ten percent of the trader sample demonstrate superior performance. The performance appraisal procedure is re-applied to the idiosyncratic portion of the returns of these investors. This test indicates that their superior performance cannot be attributed to the idiosyncratic portion of their returns. This suggests that superior performance, though infrequently obtained, can be attributed to superior forecasts of the systematic portion of returns. This is consistent with ability to accurately forecast risk premiums.

I. Introduction

This paper investigates the returns of large-position speculative traders to obtain evidence on the type of information which enables superior-return performance. Superior performance is determined using an appraisal procedure original with Merton (1981) and Henriksson and Merton (1981) and extended by Cumby and Modest (1987). This procedure does not depend on a model for equilibrium returns, relying instead on ordinal rankings of available investments. This independence from models of equilibrium returns enables subsequent consideration of the relationship between observed superior performance and equilibrium models for expected returns. Specifically, the idiosyncratic portion of the returns of traders achieving superior performance in total returns is appraised. Since idiosyncratic return components are orthogonal to systematic components, rejecting superior performance in the idiosyncratic portion attributes the superior performance to the systematic portion. This exercise provides insight into the type of information used by these investors to achieve superior returns.

Superior performance attributable to systematic-return components is consistent with superior forecasts of risk premiums paired with an ability to exploit this insight. We find that less than five percent of the large traders in our sample reliably produce superior returns. Of these, however, the performance of most is consistent with superior forecasts of risk premiums. This result has a bearing on econometric investigations of the predictability of risk premiums. If only a small proportion of traders can successfully predict risk premiums, then it is likely that the forces determining these equilibria are dynamic and complex. Given this, the frequency of econometric investigations which find no support for positive risk premiums is not surprising.[1]

The investor-performance literature focuses on whether performance is conditional on trading category. Houthakker (1957) examines the forecasting ability of large and small traders. He finds that large speculators show definite evidence of forecasting skill and small traders do well by taking, in general, only long positions. Rockwell (1967) extends Houthakker's study to consider a longer time period and more markets, finding that most profits made by large speculators can be attributed to their skill in forecasting price movements. Using the nonparametric procedure of Merton (1981) and Henriksson and Merton (1981), Chang (1985) documents that the superior forecasting ability of large speculators allows them to make higher returns. These returns are clustered within relatively few time periods suggesting that forecast ability may be conditional on certain market conditions.

Hartzmark (1987) classifies the data of reporting large traders as commercial firms (hedge positions predominate) and noncommercial firms (speculative positions predominate). He finds that a small number of large commercial firms made excess profits and their profits generally arose from short positions. He concludes however, that speculators in futures markets do not earn significant profits and that hedgers do not suffer significant losses.

Thus, previous researchers investigate the performance of aggregated trader positions. This paper investigates the performance of individual traders based on their actual trading activity. Our approach is motivated by an interest in exploring the nature of information

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[1] For references of recent papers finding no risk premiums see Gallant, Rossi, and Tauchen (1992).

which can be used to obtain superior performance. In Section II, we develop the method of classifying traders based on their performance. Section III analyses the idiosyncratic portions of the returns obtained by traders realizing superior performance. Section IV concludes the paper.

II. Designation of Superior Traders

A. Test procedure

We begin with an identification of traders obtaining superior trading ability. Merton (1981) and Henriksson and Merton (1981) develop a conditional probability method to assess forecasting ability. Merton demonstrates a necessary condition for superior forecasting ability: the sum of the probabilities of being on the right side of the market, conditional on realized price changes, must exceed one. Chang (1985), Cumby and Modest (1987), Hartzmark (1990), Weiner and Philips (1992) and So (1992) apply the method to study commodity futures, foreign exchange rate prediction, and currency futures. This procedure is briefly reviewed below.

Define percentage changes in futures prices from time t-1 to time t as r_t. Before taking a long or short position, a speculator either predicts that $r_t>0$ or that $r_t<0$. Define y_t as the forecast variable, its value is 1 if the speculator correctly predicts an increase in price and 0 if the speculator correctly predicts a decrease in price. The probabilities for y_t conditional on correctly forecasting prices are:

$$P(1,t) = prob[y_t = 1 \mid r_t > 0]$$
$$P(0,t) = prob[y_t = 0 \mid r_t < 0] \tag{1}$$

where P(1,t) is the conditional probability of a correct forecast given that the price goes up and P(0,t) is the conditional probability of a correct forecast given that the price goes down. Henriksson and Merton show that under the null hypothesis of no forecast ability, this sum is distributed hypergeometric, as follows:

$$P(n_1 \mid N_1, N, n) = \begin{pmatrix} N_1 \\ n_1 \end{pmatrix} \begin{pmatrix} N_2 \\ n - n_1 \end{pmatrix} \begin{pmatrix} N \\ n \end{pmatrix} \tag{2}$$

where n_1 is the number of correct forecasts given $r_t<0$; n is the number of times the forecaster predicts $r_t<0$; N_1 is the number of observations where $r_t<0$; N_2 is the number of observations where $r_t>0$; and the number of observations, N, is $N_1 + N_2$. These counts can be illustrated by classifying them as follows:

	Realized Price Changes		
Futures Position	Up	Down or No Change	Total
Long	N_2-n+n_1	N_1-n_1	N-n
Short	n-n_1	n_1	n
Total	N_2	N_1	N

Dividing the diagonal elements of this table by their respective row totals gives the conditional probabilities of correct forecasts. The expectation of the sum of these conditional probabilities under the null of no forecast ability is unity. The H-M test of performance considers this null. When the sample size is large, the hypergeometric distribution is approximated by the normal distribution. Obtaining the mean and variance allows z tests to be performed, the component statistics for these tests are computed as follows:

$$E(n_1) = \frac{nN_1}{N} \tag{3}$$

$$\sigma^2(n_1) = \frac{nN_1(N-N_1)(N-n)}{N^2(N-1)} \tag{4}$$

Cumby and Modest (1987) point out that the H-M test lacks power against the alternative and is valid only if returns are independent over time; in particular, this presumption of independence is violated when superior performance is obtained through use of technical trading methods. To address this issue, their regression-based procedure is also used in this study. Their procedure employs a regression of the observed changes of futures prices on a constant and an indicator variable, as in the following specification:

$$r_{it} = \alpha_{0i} + \alpha_{1i} I_{it} + \varepsilon_{it} \tag{5}$$

The indicator variable, I_{it}, is unity if trader i's position at time t is long and zero otherwise.

Thus, separate regressions are run for each trader, regressing their monthly returns on indicator variables determined by their net monthly positions. If speculators have superior forecasting ability, the coefficient of the indicator variable will reliably differ from zero. As pointed out by Weiner and Phillips (1992), the regression-based tests have the drawback of assuming the normality of forecast errors.

B. Data set

Hartzmark (1986,1987,1991) describes a data set consisting of the daily trading positions of large-position speculators and hedgers. We use this data for the period July 1, 1978 through December 31, 1981. The data set, prepared by the CFTC, classifies speculators as traders having no long positions in the corresponding cash market. From this data we construct a data set of daily positions held by speculators. This data includes date, trader-identification code, number of long and short positions, and contract month. Matching these positions with prices, we compute daily returns realized by speculators.

Traders frequently have no position on dates within the sample. The performance evaluation techniques employed here interpret positions taken and cannot evaluate no-trade decisions. To avoid this problem, positions are evaluated on a monthly basis. Thus, monthly returns are computed by compounding the daily returns of each trader and net speculative positions are constructed by netting their long and short positions. Thus, we study trading performance during each month of the sample period.

This adaptation of the test procedure requires investigation. A Monte Carlo analysis of the adaptation was conducted using the Cumby-Modest procedure. For cases where as few as five of the thirty positions within each evaluation period were, by construction, superior, 77% of the coefficient t statistics exceeded the 5% level. When ten of thirty positions were constructed as superior, 99% of the coefficient t statistics exceeded the 5% level. Finally, when no superior positions were constructed, 11% of the coefficient t statistics exceeded the 5% level. Thus, combining daily positions slightly overstates the actual number of traders achieving superior performance.[2]

Four heavily traded contracts are used in this study: the Chicago Board of Trade (CBT) wheat; the CBT U.S. Treasury bond market; the Chicago Mercantile Exchange (CME) pork bellies market; the CME feeder cattle market.

C. Results

Table 1 provides the results from the H-M method. The table lists items for each trader in the sample by identification number. Identification codes are distinct for each contract; that is, trader 1 in the wheat contract is not trader 1 in the bond contract. The listed items are: N_1, N_2, n, n_1, and the computed sums of conditional probabilities for superior performance. Superior performance is evidenced when the sum of conditional probabilities exceeds unity, a one-tail test. Plus signs indicate significance levels for superior performance. Two pluses (++) for the five percent level and one (+) for the ten percent level. Negative signs indicate significance levels for inferior performance. Two negatives (--) for the five percent level and one (-) for the ten percent level. Of the 120 traders examined, superior performance is indicated for four traders at the 10% level or better. For the wheat subsample, trader 23 demonstrates superior performance at the 10% level, correctly predicting six declines and one increase. Traders 15 and 26 of the pork contract are reliably superior at the

[2] Appendix A describes this Monte Carlo evaluation in more detail.

10% level. One cattle-contract trader demonstrates superior performance at the 5% level. Also, in passing, five traders demonstrate inferior performance at the 10% level or better. The evidence suggests taking positions opposite those taken by these traders reliably produces superior performance.

Table 2 reports results from the Cumby-Modest approach. Reported for each trader are the coefficients on position-indicator variables, the regression t statistic for the null of a zero coefficient, and its significance probability. Superior performance is indicated when the regression coefficient differs from zero, a two-tail test. To distinguish these results from the one-tailed tests of the HM method, we denote significance levels as follows: * for the 10% level and ** for the 5% level. Table 2 results are generally consistent with those of Table 1. Differences between the tables can be attributed to the higher power of the regression technique. The regression method detects superior performance by three additional traders: bond trader 15 and cattle traders 11 and 16. In total, Table 2 indicates superior performance for five traders at the ten percent level or better. As previously noted, this test procedure relies on normality of the residuals. The appropriateness of this reliance was investigated. We were unable to reject the null that the accumulated return series are normally distributed. In addition, we examined estimates of the kurtosis of these return series for evidence of non-normality. The extent of these kurtosis estimates does not warrant rejection of a normal return distribution.[3]

The small number of traders demonstrating superior performance is consistent with

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[3] Hartzmark (1988) indicates that the daily returns of his sample exhibit excess kurtosis. Our rejection of this hypothesis is consistent with evidence that returns over longer periods appear more normally distributed than do returns from shorter periods.

previous research. Hartzmark finds superior performance for 46% of his large trader sample. He regards this as small. Cumby and Modest (1987) find evidence of superior forecasting in five firms in their sample of seven foreign-exchange advisory services. Restricting their sample to a consistent time period, as we do in this paper, reduces their number of superior forecasters to two.

III. Analysis of the Source of Superior Performance

A. Decomposition of returns

Position returns are categorized as systematic $E[R_t|\sigma_m]$ and idiosyncratic R_t - $E[R_t|\sigma_m]$ using the expected-return model of Ross (1976). Applying the Merton procedure to the idiosyncratic portion of these returns enables us to determine the likelihood that individual traders can predict either (or both) the systematic portion of return or the idiosyncratic portion. Since the previous classification of traders found evidence of superior performance, the results of this test allow us to conclude whether superior performance is based on the ability to predict systematic or idiosyncratic returns.

The Arbitrage Pricing Model of Ross (1976) is employed to estimate expected return components. Chen, Roll and Ross (1986) employ specific factors in their specification for the APT. We adopt this specification which is denoted as follows:

$$r_{it} - r_{ft} = b_1 UI_t + b_2 E[I_t] + b_3 YP_t + b_4 UTS_t + b_5 URP_t + b_6 EP_t + e_{it} \quad (6)$$

where UI_t is unexpected inflation, $E[I_t]$ is expected inflation, YP_t is growth in industrial production, UTS_t is the maturity spread between long-term and short-term default-free rates of interest, URP_t is the spread between high and low rated corporate bonds, and EP_t is the equity risk premium. Equity data are monthly returns obtained from the CRSP tapes. Equity returns are matched with macroeconomic data obtained from Money Market Surveys. The sample period is July, 1978 through December, 1981, corresponding to the sample period of the large-trader data set.

Table 3 reports the results for this specification. Results are not surprising. The maturity spread is positively related to returns for the bond contract. Returns on wheat contracts are related to industrial production. The equity premium enters significantly for all but the pork contract. The significance of the coefficient on equity risk premiums contrasts with the empirical results of Dusak (1973), but conforms with the predictions of equilibrium-return models such as the consumption beta model of Richard and Sundaresan (1981). Ehrhardt, Jordan and Walkling (1987) employ the APT to obtain evidence of risk premiums in futures contracts. They reject the Keynes-Hicks hypothesis based on examination of coefficients on extracted factor loadings from the returns of 16 futures contracts over an 85-month sample period, 1977 through 1980. Our use of the APT differs. We partition returns into their systematic and idiosyncratic portions in order to investigate the source of superior performance.

B. Performance analysis of the idiosyncratic portion of returns

Subtracting the systematic portion of returns obtained from the specification summarized in the previous subsection from total returns produces the idiosyncratic components of these returns. The contract positions of traders obtaining superior returns are merged with the idiosyncratic return sample to obtain the idiosyncratic returns realized by members of the superior-trader subsample. By construction, these are orthogonal to the systematic return components. Thus, rejecting superior performance for the idiosyncratic portion implies that superior performance is based on forecasts of the systematic portion which can be interpreted as the risk premium. This, in turn, implies that superior return performance can be obtained by placing positions based on forecasts rooted in an equilibrium model of returns.

Table 4 contains results from this analysis. Panel A reports results from re-applying the Merton procedure to the idiosyncratic portion of superior trader returns. The results suggest that the superior performance of these traders cannot be attributed to the idiosyncratic portion of their returns. Panel B indicates that at the ten percent confidence level, two of six traders obtained superior performance from the idiosyncratic portion of their returns. This evidence suggests that superior performance is more often based on predictions of the systematic component of returns.

The possibility that trading performance is time dependent was examined. Time dependence suggests that trading performance might be tied to a single macroeconomic variable. For example, suppose a trader's performance was based on recognition of the impact of the 1978-79 oil price shock on futures prices, then we would expect the dates of their superior performance to be clumped within this interval. To check this possibility, we graphed the incidences of returns for the superior-performance traders. For most of the traders demonstrating superior performance, the incidences of their superior trades appears approximately uniform over the sample period. This indicates that trading performance is not clumped as might be expected when performance is tied to a single indicator. The one exception is wheat trader 23, see Figure 1. The superior performance of that trader appears to come after mid-1979.[4] These results indicate that superior performance is obtained when traders can accurately predict the systematic portion of returns. Following the APT framework, evidence of accurate predictions of systematic returns implies accuracy in predictions of risk premiums.

IV. Conclusion

The performance of a sample of large speculators in four futures contracts is investigated using the performance-appraisal procedures of Henriksson and Merton (1981) and Cumby and Modest (1987). We find that superior performance within this sample is not frequently realized. This is consistent with previous analysis of the performance of futures traders.

Futures returns are then decomposed into their systematic and idiosyncratic components following the Arbitrage Pricing Model of Ross (1976) using the Chen, Roll and Ross (1983) specification. We compute the idiosyncratic portion of the returns of each trader demonstrating superior performance. Re-application of the performance appraisal procedures indicates that superior performance is generally attributable to the systematic return component. The results cannot be explained as violations of the normality assumption; and in most cases, superior return performance is not time dependent. This result suggests that superior performance, when obtained, is likely to be based on predictions of risk premiums.

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[4] Graphs of return incidences for each of the superior-performance traders are available on request.

Appendix A
Monte Carlo Analysis of Accumulating Returns

Thirty normally-distributed, iid, returns were generated for each evaluation period. For each evaluation period a fraction, α, of these returns were restricted to be positive. For example, with $\alpha = 1/6$, the first five returns of the evaluation period were positive. For returns 1 through 5, the generation process was repeated until five positive returns were obtained. The remaining returns, the fraction $1-\alpha$, were then generated without this restriction. This procedure assures that a given number of returns will be positive. However, the underlying distribution of all returns within the evaluation period is the same. This generation process was repeated for 120 evaluation periods for each of 100 traders. The Cumby-Modest performance appraisal procedure was then applied to these samples. Results are reported in the text. As a sensitivity check, the procedure was re-applied for various combinations of mean and variance combinations governing the return-generation process. The procedure appears to be robust for mean-variance combinations such as observed during our sample period.

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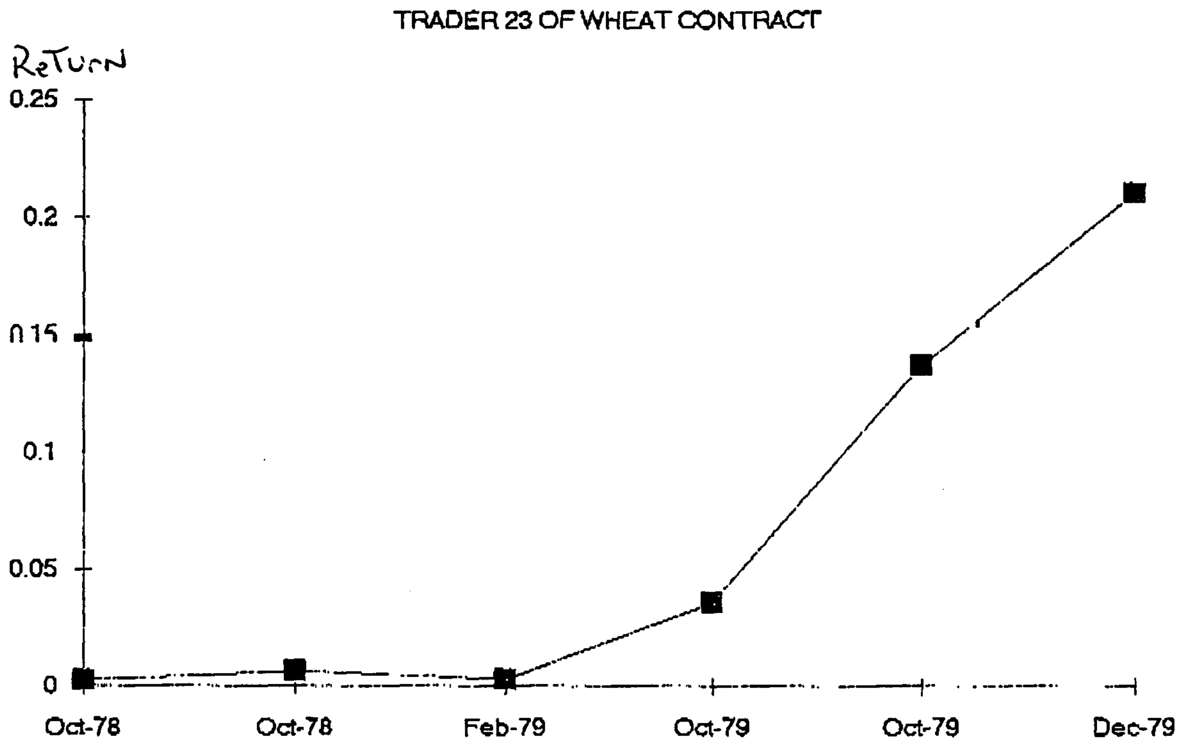
Figure 1



TRADER 23 OF WHEAT CONTRACT
Return
0.25
0.2
0.15
0.1
0.05
0
Oct-78
Oct-78
Feb-79
Oct-79
Oct-79
Dec-79

Table 1
Sum of Estimated Conditional Probability
of Correct Forecasts

	Wheat					Bond					Pork					Cattle				
Trader	N_1	N_2	n	n_1	P	N_1	N_2	n	n_1	P	N_1	N_2	n	n_1	P	N_1	N_2	n	n_1	P
1	42	45	42	20	0.99	59	59	63	30	0.95	45	51	59	29	1.06	31	19	26	17	1.07
2	102	80	77	41	0.95	46	59	66	27	0.92	67	27	43	34	1.14	26	36	25	12	1.10
3	51	64	66	33	1.13	82	55	79	46	0.96	48	20	37	27	1.05	60	56	70	36	0.99
4	119	85	97	57	1.01	28	27	31	17	1.09	8	14	11	4	1.00	33	32	33	18	1.08
5	42	30	33	20	1.04	69	58	55	31	1.04	24	18	16	9	0.99	15	14	4	2	0.98
6	34	32	25	13	1.01	27	29	26	14	1.11	33	13	24	16	0.89	21	17	16	11	1.23
7	35	26	31	17	0.95	39	29	47	28	1.07	49	40	46	24	0.94	33	26	24	14	1.04
8	42	45	39	19	1.01	50	40	42	26	1.12	71	19	51	40	0.99	48	3	21	20	1.02
9	74	30	46	35	1.09	42	32	45	26	1.03	54	32	46	29	1.01	36	50	41	19	1.09
10	27	17	19	13	1.12	32	31	26	14	1.05	34	31	27	17	1.18	32	40	38	18	1.06
11	62	75	75	33	0.97	33	27	44	21	0.73^{-}	31	28	32	18	1.08	22	52	24	10	1.18
12	66	115	92	32	0.97	43	58	53	25	1.10	40	29	28	16	0.99	48	67	44	21	1.10
13	7	5	3	1	0.67	62	65	68	28	0.84^{-}	35	51	48	18	0.93	26	35	28	17	1.33^{++}
14	100	38	70	49	0.95	36	50	53	24	1.09	37	10	22	16	0.99	25	47	39	12	0.91
15	108	71	113	68	1.00	46	21	45	32	1.07	50	9	31	29	1.19^{+}	25	51	34	10	0.94
16	63	58	44	25	1.07	43	41	44	21	0.93	16	18	17	7	0.88	10	48	18	5	1.15
17	59	65	67	34	1.07	65	37	57	34	0.91	54	50	64	30	0.87	47	28	38	24	1.01
18	114	85	88	55	1.09	35	13	29	22	1.07	30	26	26	12	0.86	38	34	32	20	1.17
19	29	34	29	12	0.91	32	36	37	16	0.92	35	16	30	19	0.87	35	45	37	14	0.89
20	35	34	21	10	0.96	53	75	79	34	1.04	33	31	23	15	1.21	27	35	20	10	1.10
21	8	14	8	3	1.02	74	60	76	39	0.91	2	13	5	1	1.10	28	22	14	9	1.12
22	34	26	30	16	0.93	27	18	31	18	0.94	47	42	40	20	0.95	35	31	32	15	0.88
23	10	7	7	6	1.46^{+}	59	37	54	29	0.82^{-}	12	12	13	6	0.92	48	25	25	17	1.03
24	37	28	35	22	1.13	57	54	79	42	1.06	34	12	24	16	0.85	30	39	35	15	0.99
25	57	62	51	23	0.95	109	93	108	58	0.99	28	9	16	13	1.10	47	57	46	19	0.93
26	117	124	108	52	0.99	86	63	97	59	1.09	8	14	8	5	1.14^{+}	42	44	38	14	0.79^{-}
27	22	19	27	16	1.16	51	53	58	27	0.94	34	12	19	11	0.73^{--}	22	45	29	8	0.91
28	24	40	36	16	1.16	54	34	52	30	0.91	22	14	23	14	0.99	13	12	17	7	0.66
29	121	117	120	58	0.95	121	84	117	68	0.98	0	0	0	0	0.00	16	69	45	11	1.12
30	26	20	26	15	1.03	47	47	54	29	1.09	21	17	18	10	1.10	43	40	39	19	0.94

Notes: n_1 is the number of correct forecasts given $r_t<0$; n is the number of times the forecaster predicts $r_t<0$; N_1 is the number of observations where $r_t<0$; N_2 is the number of observations where $r_t>0$; and the number of observations, N, is $N_1 + N_2$.
Significance levels are for the hypothesis that sum of the conditional probabilities, P, exceed unity. Significance levels for the null of superior performance are indicated as follows: + 10% level and ++ 5% level. Significance levels for the null of inferior performance are indicated as follows: - 10% level and -- 5% level.

Table 2
Regression Tests of Forecasting Ability

$$r_{it} = \alpha_{0i} + \alpha_{1i} I_{it} + \varepsilon_{it} \quad (5)$$

Trader	Wheat ß	Wheat t Stat.	Wheat P>|t|	Bond ß	Bond t Stat.	Bond P>|t|	Pork ß	Pork t Stat.	Pork P>|t|	Cattle ß	Cattle t Stat.	Cattle P>|t|
1	0.29	-0.43	0.67	-0.50	-0.99	0.32	0.47	0.33	0.74	0.49	0.59	0.56
2	-0.01	-0.01	0.99	-0.53	-0.83	0.41	1.08	0.96	0.33	0.51	1.01	0.32
3	0.18	0.25	0.81	-0.31	-0.92	0.36	3.06	1.60	0.12	-0.02	-0.05	0.96
4	0.63	1.02	0.31	-0.09	-0.09	0.93	-0.64	-0.34	0.74	-0.15	-0.27	0.78
5	-0.62	-0.85	0.40	0.51	1.38	0.17	0.45	0.38	0.71	0.30	0.29	0.77
6	0.74	0.77	0.45	-0.85	-0.93	0.36	0.44	0.17	0.86	0.46	0.33	0.75
7	-0.35	-0.59	0.56	-0.20	-0.25	0.80	-0.65	-0.35	0.73	-1.05	-1.07	0.29
8	-0.29	-0.51	0.61	1.11	1.45	0.15	0.51	0.38	0.71	0.49	0.32	0.75
9	0.80	1.24	0.22	-0.05	-0.09	0.93	0.30	0.22	0.82	0.09	0.16	0.88
10	-0.75	-0.43	0.67	0.19	0.27	0.79	0.81	0.55	0.58	0.49	0.58	0.56
11	-0.77	-1.02	0.31	-1.32	-1.86*	0.07	1.68	1.35	0.18	2.00	2.40**	0.02
12	-0.14	-0.25	0.81	0.43	0.80	0.43	0.70	0.45	0.66	0.50	1.00	0.32
13	0.12	0.11	0.91	-0.44	-1.42	0.16	-1.26	-0.93	0.35	2.01	2.62**	0.01
14	0.03	0.05	0.96	0.37	0.50	0.62	-0.75	-0.53	0.60	0.14	0.17	0.87
15	0.31	0.68	0.50	1.64	2.31**	0.02	4.80	1.60	0.12	-0.23	-0.46	0.65
16	0.99	1.61	0.11	-0.23	-0.40	0.69	-1.87	-0.88	0.38	1.92	1.67*	0.10
17	-0.34	-0.60	0.55	-0.67	-1.18	0.24	0.37	0.36	0.72	1.94	0.78	0.44
18	-0.29	-0.49	0.63	0.52	0.42	0.68	-1.18	-0.75	0.46	24.54	1.07	0.29
19	0.11	0.11	0.92	0.44	0.75	0.46	-0.13	-0.05	0.96	-0.37	-0.44	0.66
20	0.03	0.05	0.96	0.16	0.32	0.75	2.25	1.99**	0.05	0.91	1.10	0.28
21	1.50	0.81	0.43	0.01	0.03	0.97	1.23	0.30	0.77	0.99	0.91	0.37
22	-0.04	-0.05	0.96	-0.15	-0.12	0.90	0.66	0.58	0.56	1.82	0.64	0.52
23	2.72	2.69**	0.02	0.14	0.39	0.70	-0.95	-0.35	0.73	-0.23	-0.40	0.69
24	0.05	0.09	0.93	0.13	0.37	0.71	-1.13	-0.41	0.68	0.02	0.03	0.98
25	-0.09	-0.13	0.90	0.20	0.80	0.43	1.94	1.32	0.19	-1.30	-0.76	0.45
26	-0.02	-0.04	0.97	0.23	0.82	0.41	2.22	0.82	0.42	-1.03	-1.45	0.15
27	-0.12	-0.11	0.91	-0.32	-0.78	0.44	-3.58	-2.31*	0.06	1.31	1.58	0.12
28	0.89	1.05	0.30	-0.90	-1.60	0.41	1.50	0.83	0.41	-3.22	-1.36	0.19
29	0.11	0.21	0.83	0.15	0.55	0.58	0.00	0.00	0.00	0.31	0.50	0.62
30	0.76	1.13	0.26	-0.01	-0.02	0.99	0.68	0.33	0.74	-1.06	-1.75*	0.08

Significance levels are for the null that the regression coefficient differs from zero. These are indicated as follows: * at the 10% level and ** at the 5% level.

Table 3
APT Estimates of Futures Returns

Futures Contract	a	b_1	b_2	b_3	b_4	b_5	b_6	R^2	DW
Wheat									
March	0.0090	2.7421	-5.4560	2.3016	0.2983	0.2207	0.2898	0.20	2.33
	(0.77)	(0.78)	(-1.34)	(2.07)	(0.34)	(0.28)	(1.39)		
May	0.0139	1.9533	-5.5135	2.2336	0.7115	0.6697	0.3676	0.21	2.53
	(1.16)	(0.54)	(-1.31)	(1.95)	(0.78)	(0.81)	(1.70)		
July	0.0049	2.1303	-3.2186	1.4348	-0.2484	-0.1367	0.5497	0.21	2.01
	(0.40)	(0.59)	(-0.76)	(1.25)	(-0.27)	(-0.17)	(2.54)		
September	0.0037	2.8897	-2.6110	2.2377	-0.2101	-0.1857	0.4900	0.26	2.23
	(0.33)	(0.84)	(-0.65)	(2.05)	(-0.24)	(-0.24)	(2.38)		
December	0.0129	2.4784	-3.8690	2.1907	0.4815	0.4398	0.4192	0.21	2.42
	(1.06)	(0.68)	(-0.91)	(1.88)	(0.52)	(0.53)	(1.91)		
Treasury Bond									
March	-0.0035	-0.9944	0.1189	0.1219	1.2808	0.3779	-0.0600	0.89	2.17
	(1.01)	(-1.02)	(0.09)	(0.17)	(5.51)	(1.83)	(-1.10)		
June	0.0094	0.1549	-1.0652	-0.1186	1.6564	0.7422	-0.0007	0.87	1.77
	(2.67)	(0.15)	(-0.87)	(-0.35)	(6.22)	(3.07)	(-0.01)		
September	0.0053	-0.9593	0.7881	-0.0840	1.2501	0.3536	-0.1278	0.87	2.30
	(1.64)	(-0.99)	(0.70)	(-0.27)	(5.15)	(1.60)	(-2.21)		
December	0.0037	-0.9422	0.6747	0.8318	1.0881	0.2504	-0.1855	0.65	1.73
	(0.69)	(-0.58)	(0.36)	(1.62)	(2.68)	(0.68)	(-1.92)		
Cattle January contract missing									
March	0.0122	4.7035	-2.1316	0.9382	0.8926	0.9236	0.3836	0.27	1.50
	(1.42)	(1.82)	(-0.71)	(1.15)	(1.38)	(1.57)	(2.51)		
April	0.0039	2.7007	-6.4791	0.2637	-0.2246	-0.1956	0.4539	0.29	1.79
	(0.43)	(0.94)	(-2.06)	(0.31)	(-0.33)	(-0.32)	(2.81)		
May	0.0021	4.3005	-5.8067	0.3097	0.1519	0.2312	0.5201	0.31	1.59
	(0.23)	(1.57)	(-1.82)	(0.36)	(0.22)	(0.37)	(3.17)		
August	0.0066	3.1083	-5.9407	-0.2895	0.2229	0.3562	0.6228	0.29	1.87
	(0.64)	(1.01)	(-1.66)	(-0.30)	(0.29)	(0.51)	(3.39)		
September	0.0053	2.3203	-5.0943	-0.4492	0.1213	0.2483	0.5476	0.23	1.80
	(0.50)	(0.73)	(-1.39)	(-0.45)	(0.15)	(0.34)	(2.90)		
October	-0.0032	2.6284	-6.6416	-0.2933	0.1942	0.2604	0.6897	0.38	2.00
	(0.34)	(0.93)	(-2.02)	(-0.33)	(0.27)	(0.40)	(4.07)		
November	-0.0046	1.9542	-7.1932	-0.4169	0.2656	0.2818	0.6047	0.33	1.77
	(0.47)	(0.67)	(-2.11)	(-0.45)	(0.36)	(0.42)	(3.45)		
Pork									
February	0.0018	8.7761	-1.3024	1.0206	-0.0403	0.0689	0.6779	0.11	2.03
	(0.08)	(1.27)	(-0.16)	(0.47)	(-0.02)	(-0.04)	(1.64)		
March	-0.0060	5.3345	-7.2354	2.3630	-0.8891	-0.7969	0.4649	0.10	2.36
	(-0.26)	(0.76)	(-0.89)	(1.06)	(-0.51)	(-0.50)	(1.11)		
May	-0.0137	3.9837	-10.042	2.0324	-0.7683	-0.4841	0.7147	0.13	2.15
	(-0.57)	(0.55)	(-1.19)	(0.89)	(-0.42)	(-0.29)	(1.65)		
July	-0.0173	2.2837	-13.013	3.1358	-0.9934	-0.8241	0.5696	0.14	1.94
	(-0.67)	(0.30)	(-1.45)	(1.28)	(-0.51)	(-0.47)	(1.23)		
August	-0.0135	0.6046	-16.227	3.2292	-1.5365	-1.1751	0.3209	0.11	1.83
	(-0.45)	(0.07)	(-1.56)	(1.14)	(-0.68)	(-0.58)	(0.60)		

(t statistics in parentheses)

Table 4
Performance Analysis of Nonsystematic Portion of Returns
Conditional on a Superior Evaluation of Total Return Performance

Panel A
Henrikkson and Merton Procedure

Trader	Contract	N_1	N_2	n	n_1	P
23	Wheat	10	7	4	1	0.56
15	Pork	49	9	34	29	1.02
26	Pork	7	8	8	4	1.07
13	Cattle	17	22	8	4	1.08

Notes: n_1 is the number of correct forecasts given $r_t<0$; n is the number of times the forecaster predicts $r_t<0$; N_1 is the number of observations where $r_t<0$; N_2 is the number of observations where $r_t>0$; and the number of observations, N, is $N_1 + N_2$.
Significance levels are for the hypothesis that sum of the conditional probabilities, P, exceed unity. Significance levels for the null of superior performance are indicated as follows: + 10% level and ++ 5% level. Significance levels for the null of inferior performance are indicated as follows: - 10% level and -- 5% level.

Panel B
Cumby and Modest Procedure

$$r_{it} = \alpha_{0i} + \alpha_{1i} I_{it} + \varepsilon_{it} \quad (5)$$

Trader	Contract	ß	t Stat.	P>|t|
23	Wheat	-0.33	-1.60	0.13
15	Bond	-0.07	-0.54	0.59
20	Pork	0.28	1.84*	0.07
11	Cattle	-0.21	-1.39	0.17
13	Cattle	0.05	0.40	0.69
16	Cattle	0.53	3.42**	0.01

Significance levels are for the null that the regression coefficient differs from zero. These are indicated as follows: * at the 10% level and ** at the 5% level.