NCCC-134
APPLIED COMMODITY PRICE ANALYSIS, FORECASTING AND MARKET RISK MANAGEMENT

Predictability of Commodity Trading Advisor Returns

by

Barry Ward, Scott H. Irwin, and Carl R. Zulauf

Suggested citation format:

Ward, B., S. H. Irwin, and C. R. Zulauf. 1991. "Predictability of Commodity Trading Advisor Returns." Proceedings of the NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management. Chicago, IL. [http://www.farmdoc.uiuc.edu/nccc134].

PREDICTABILITY OF COMMODITY TRADING ADVISOR RETURNS

Barry W. Ward, Scott H. Irwin, and Carl R. Zulauf*

Introduction

Commodity marketing is an important activity for virtually all agricultural producers. In a recent survey (Smith), 80 percent of interviewed producers indicated that marketing decisions were important to their financial success. This survey also found that 66 percent of the producers had used a market advisory service. Out of 11 market information sources, market advisory services were ranked first in terms of usefulness.

Producers utilize market advisory services in a variety of ways. Some use the service only as an information source, while others follow their trading recommendations. A relatively new trend is for producers to turn hedging decisions over to a market advisory service (Faivre). In this capacity, the market advisory service, formally referred to as a Commodity Trading Advisor (CTA), is responsible for executing all futures trading decisions.

If a producer chooses to delegate hedging decisions to a CTA, selection of the CTA becomes a critical decision. Producers may examine a number of factors in selecting a CTA, including education, experience, and personal integrity of the principal partners of the firm. However, the primary factor is likely to be the CTA's expected trading record. Producers presumably will choose a CTA that will maximize returns subject to the risk they are willing to assume in the hedging operation. Since future returns are unknown, the ability to predict future returns of CTAs becomes an important consideration.

Two studies have investigated the predictability of CTA returns. Edwards and Ma and Elton, Gruber and Rentzler found no evidence that the historical record of a public commodity pool's trading advisor, as reported in the pool's prospectus, was a useful predictor of the CTA's future performance. However, these results are based on small samples of CTAs: 55 and 71, respectively. Furthermore, CTA performance was evaluated over relatively short time horizons. (1978-1983 and 1979-1985 respectively.)

---

*Graduate Research Associate, Associate Professor, and Associate Professor, respectively, in the Department of Agricultural Economics and Rural Sociology, The Ohio State University. The authors are indebted to Aladin T. Abughazaleh of A.T.A. Research, Inc. for providing data on CTA returns. Appreciation is expressed to Mary Gerlow and Gary Schnitkey for their helpful comments on an earlier draft of this paper. The research was partially funded by a grant from the Farm Income Enhancement Program at The Ohio State University.

In contrast this study will test the predictability of CTA performance by using a database composed of the monthly returns for 363 CTA trading accounts over the period, January 1979 through December 1989. This data has been made available by A.T.A., Inc., a private firm specializing in analysis of CTA performance.

Predictability of CTA returns will be evaluated by first calculating rank correlation coefficients between measures of CTA investment performance for all CTA accounts traded in adjacent paired years, for example 1988 and 1989. The measures of investment performance are average return, standard deviation, and Sharpe Ratio.

Consistency of CTA returns also will be evaluated by first separating CTAs by deciles (10% increments) in year t (1981-1988). The decile ranking of a CTA in year t is compared with its decile rank in year t+1 (1982-1989). Analysis of deciles shows whether top and bottom performing CTAs exhibit differential predictability. For example, if there is consistency in CTA returns from year to year, a firm with a return that ranks it in decile one in year t also will rank in decile one in year t+1.

Commodity Trading Advisor Returns

Data

The A.T.A. data base includes only those CTAs managing funds for outside investors. The basic observational unit in the A.T.A. data is the CTA trading account. CTA trading accounts are determined by CTA and trading strategy. CTAs trading one account count as one observation. CTAs trading more than one account, but using similar trading strategies for all accounts are also counted as one observation. The returns for all accounts are compiled into a composite return for the CTA.

CTAs trading more than one account using different trading strategies for the accounts are recorded as different CTA trading accounts, i.e. observations. Of the 363 CTA trading accounts in this study, 252 have a single account or a composite account return. Forty-nine CTAs have more than one trading account but use different trading strategies for at least some of the accounts. These 49 CTAs accounted for 111 trading accounts.[1]

A.T.A. obtained the return data in several ways: (1) CTA disclosure documents, (2) offering documents for private commodity pools or public commodity funds in which a participating CTA's track record is disclosed, (3) regular verbal updates which are later spot checked against the data that appear in disclosure documents, (4) regular written updates which are received on a monthly basis, and/or (5) industry newsletters when data is unavailable from other sources.

The database covers past and current CTA trading accounts. Reasons why return data may have ceased for a particular CTA trading account are: (1) the advisor went out of business, (2) the trading strategy is no longer offered to investors, (3) the trading system has changed materially to the point where it is no longer relevant to an evaluation of the

currently offered program, (4) the data initially were obtained from sources other than the advisor's office and updates are not available, and (5) in rare instances, an advisor simply stops reporting performance data.

CTAs included in the A.T.A. data set manage only speculative accounts. Further, the CTAs trade widely varying portfolios of commodity futures and options contracts. Some trade a highly diversified portfolio across many different markets. Others specialize in a specific area. For example, some CTAs specialize in foreign currency futures markets, while others may trade solely in agricultural futures markets.

Nineteen seventy nine is chosen as the starting point of the current analysis for two reasons. First, the number of CTAs trading before 1979 was less than ten, the minimum number assumed to allow reliable statistical inferences. Second, the 1979-1989 period allows us to compare our results to previous studies with the same or similar time frames.

Elton, Gruber, and Rentzler's procedures are followed for determining when CTAs enter and exit the data set. A CTA does not enter a calendar year's data set until its first January of trading. If CTA returns are no longer available at some point in a year, funds are assumed to be reinvested at the riskless rate of return (Treasury-bill) until the end of the calendar year.

CTA Returns

The monthly return data obtained from A.T.A. Inc. were in discrete form. These discrete monthly returns were converted into logarithmic form to obtain continuously-compounded returns. Log return is the measure used by most investigators of return distributions. This measure also is preferable because it has additive properties that are desirable, and also approximates long term returns.

The yearly mean, standard deviation, and Sharpe Ratio of the returns to the market portfolio of CTA trading accounts are presented in Table 1. To calculate these performance measures, an equal amount of money is assumed to be invested in all CTA trading accounts at the beginning of a year. Available funds at the end of the year are then equally invested in all trading accounts at the beginning of the next year. An average index value is calculated for all CTA trading accounts for all months. Returns to this monthly index are then averaged across the twelve months and annualized to give a yearly equally-weighted market portfolio return for all CTAs.

Yearly CTA trading account returns were highly variable over the 1979-1989 period. They ranged from a high of 79.957 percent in 1979 to a low of 4.725 percent in 1989. Average annual rate of return for the entire sample period was 30.293 percent. In comparison, reflecting the effect of the large returns in the first three years of the sample, annual rate of return averaged 23.072 percent for 1982-89 and 21.021 percent for 1985-89.

Standard deviation is calculated as the standard deviation of the monthly index of returns for the equally-weighted portfolio of all CTA trading accounts. This standard

deviation is annualized.[2] The average monthly standard deviation from 1979 to 1989 was 21.332 percent per year. As with returns, standard deviation is noticeably higher in the first two years. After 1981 standard deviation stabilizes in the 16 to 20% range. Compared with the rate of return, standard deviation was relatively stable across the sub-periods.

Given the well-known positive relationship between the return and risk of investments, a measure of return-risk performance is needed. A widely used method of ranking individual investment alternatives is the Sharpe Ratio,

$$\frac{R_c - R_f}{\sigma_c} \qquad (1)$$

where
R_c = the expected return of CTA trading account c,
R_f = the risk-free return,
σ_c = the standard deviation of CTA trading account c.

As equation (1) shows, the numerator is the "excess" return of a CTA account above the risk-free return. Dividing the excess return by the standard deviation of returns produces a normalized measure of return-risk tradeoff. Specifically, the Sharpe Ratio can be interpreted as the excess return of a CTA per unit of risk. As a result, the higher the Sharpe Ratio the better is the return-risk performance of CTAs.

The annualized Sharpe Ratio of CTAs for the entire sample period is 1.015 (Table 1). By comparison, Irwin, Krukemyer, and Zulauf find that common stocks have an annual Sharpe Ratio of 0.558 over the same sample period. Hence, the stand-alone performance of the portfolio of CTAs over the full sample is superior to that of common stocks. This is the case for the two sub-periods as well. The Sharpe Ratio for CTAs in the 1982-89 sub-period is 0.862 while common stocks had a 0.679 Sharpe Ratio. During 1985-89, the Sharpe Ratio for common stocks is 0.776, but 0.863 for the portfolio of CTAs.

The Predictability of Commodity Trading Advisor Returns

Rank Correlation Results

Rank correlations are calculated to determine whether CTAs that have high returns or risk in one year also tend to have high returns or risks in the following year. A graph of the data reveal numerous outliers. Rank correlations are used to eliminate any statistical anomalies resulting from these outliers on simple Pearson correlations. Rank correlations can range from +1 to -1 with +1 indicating perfect positive correlation. Rank correlation (RC) is defined as follows (Siegel),[3]

$$RC = 1 - \frac{6 \sum_{i=1}^{N} (r_{i,t} - r_{i,t+1})^2}{N(N^2 - 1)} \qquad (2)$$

where,

$r_{i,t}$ = rank in year t,
$r_{i,t+1}$ = rank in year t+1,
N = number of paired observations.

Rank correlations for rate of return, standard deviation, and Sharpe Ratio are calculated for all CTA trading accounts active in back to back years. For example, the 13 CTA trading accounts are ranked from highest to lowest in 1979 and 1980 according to their average return. The rank correlation is then computed between the 1979 and 1980 ranked sets. Note that CTAs that begin trading in 1980 (not trading in 1979) will not be included in the 1979-80 rank correlation.

Table 2 displays the rank correlations for average return, standard deviation, and Sharpe Ratio across all pairs of years. The average return of CTA trading accounts doesn't display a great deal of predictability as only three of the ten paired years have significant rank correlations. The average of the rank correlations for all ten paired years is only 0.127 which reinforces the notion of little predictability in CTA returns. Further, the most recent 3 sets of paired years display rank correlations of 0.048, -0.020, and 0.043, which suggests that the most recent behavior for CTAs indicates no predictability of returns.

On the other hand, rank correlations of the standard deviation of returns are significantly positive for all ten years, indicating a high degree of predictability in the risk component of CTA trading account returns. The high predictability for standard deviation is evidence that CTAs use trading strategies with similar risk from one year to the next.

The Sharpe Ratio results are similar to the rate of return results. Only the rank correlations for 1985 and 1986 are significantly positive. The average rank correlation for the 10 paired years is only 0.009.

CTA Performance Ranked by Deciles

To examine the performance of the top and bottom performing CTAs trading accounts from year t to year t+1 (CTAs in this analysis must be active in both years), the accounts' performance measures (return, standard deviation, and Sharpe Ratio) are ranked in year t from top to bottom. The year t ranked returns are then grouped into deciles. (The highest ranking 10%, the second highest 10%, and so on...) Summary statistics are calculated for the performance in year t+1 of CTAs in each decile for year t. These decile-specific performance measures give a picture of the consistency of performance from 1981 to 1989. We dropped the first two years (1979 and 1980) from this analysis because of their

small number of observations (13 and 24 CTAs respectively). The small number of observations allowed too few observations in each decile to give us meaningful results.

Tables 3 displays average return in year t+1 and average rank in t+1 by performance deciles in year t. Decile 1 consistently ranks higher than the other deciles and consistently outperforms the average returns (Table 1) for all CTA trading accounts for the entire period. Decile 1 ranks highest with an average rank of 2.875 for the entire period and a 31.588 percent return for the entire period. This is significantly higher than the average return of all CTA trading accounts which is the rate of return an investor would receive if they invested in all CTAs for the 1982-1989 period (Table 1).

A surprising result is the outstanding performance of the bottom decile. (Those CTAs performing the poorest in year t.) For the 1981-89 period, CTAs in decile 10 had an average rank of 4.750 and a 37.508% rate of return in year t+1. This average return is significantly higher than the average return for all CTAs (Table 1).

Deciles 1, 2, and 3, have an average decile rank which is lower than its rank in year t. In contrast, deciles 8, 9, and 10 have an average decile rank which is higher than its rank in year t. This is suggestive of a return-to-the-mean process.

To examine consistency in performance on risk, the CTA trading accounts are ranked from lowest to highest standard deviation in year t. Decile 1 contains the 10% of CTAs with the lowest standard deviations and so on. There is strong evidence supporting consistency in the standard deviation of returns for CTAs (Table 3). Standard deviation of CTA trading returns ranked in decile 1 in year t consistently remain the lowest in average rank and average standard deviation. Deciles 2 through 10 also consistently perform in year t+1 at or very near to the order they performed at in year t.

Consistency of Sharpe Ratio from year t to t+1 are similar to that of average return (Table 3). CTAs in decile 1 during year t consistently performed the highest in year t+1 as they had an average rank of 2.625 and an average Sharpe Ratio of 1.174. Their average Sharpe Ratio is significantly higher than the Sharpe Ratio for all CTAs (0.862), and is the only decile that maintains a higher than average Sharpe Ratio in t+1.

Deciles 2 through 10 do not show any consistent signs of predictability of Sharpe Ratio. These findings for Sharpe Ratio are similar to the return findings. The return-to-the-mean hypothesis is substantiated by the results in deciles 2 through 10 (Table 3). Decile 2, 3, and 4, have an average rank lower than their respective ranks in year t, while deciles 8, 9, and 10 have an average rank which is higher than their respective ranks in year t+1.

Summary and Conclusions

This study provides a comprehensive analysis of the predictability of CTA performance. The database contains 363 CTA trading accounts over an eleven year period, 1979-1989.

Only the rank correlation of the standard deviation of CTA returns are predictable across the years. In contrast, rank correlations for returns and Sharpe Ratio reveal little predictability.

Tests for consistency across CTA performance deciles refines this story. CTA returns display consistency in the top decile. This suggests that a CTA with a rate of return in the top decile in period t will be an above average performer in period t+1. None of the other deciles provide evidence of being able to outperform the average return for all CTAs.

In contrast to returns, risk (measured as standard deviation) is highly predictable. CTAs with low risk in year t will have low risk in year t+1. Also, CTAs with highly volatile trading records will continue to trade with high risk in year t+1. These conclusions are not surprising because CTAs follow similar trading strategies from one year to the next.

Predictability of Sharpe Ratio differs little from predictability of return. The first decile of CTAs outperform the average for all CTAs significantly. This should send a signal to the investor looking for a high return to risk trade-off that investing in the top ten percent of CTAs in year t will lead to an above average return to risk trade-off in year t+1. Again, deciles 2 through 10 provide little evidence of being able to outperform the mean.

It should be noted that the results of this study are based on CTA returns on speculative accounts. Producers are naturally interested in CTA returns for hedging accounts. If we assume that CTAs use similar trading principles and guidelines for speculative accounts and hedging accounts, then the results of this study suggest that producers can select the very top performing CTAs and be reasonably confident that they will perform above average in managing their hedging accounts.

REFERENCES

Smith, R. "National Assessment of Producer Marketing Alternatives: Practices and Attitudes." Texas Agricultural Extension Service, April, 1989.

Faivre, S. "Knowing Your Limits." *Farm Futures*, February 1990, p. 14.

Elton, E.J., M.J. Gruber and J.C. Rentzler. "New Public Offerings, Information, and Investor Rationality: The Case of Publicly Offered Commodity Funds," *Journal of Business*, 62(1989):1-15.

Edwards, F.R. and C. Ma. "Commodity Pool Performance: Is the Information Contained in Pool Prospectuses Useful?" *Journal of Futures Markets*, 8(1988):589-616.

Irwin, S.H., T.R. Krukemyer, and C.R. Zulauf. "Investment Performance of Public Commodity Pools: 1979 to 1989." Working paper. The Ohio State University. Department of Agricultural Economics and Rural Sociology. January 1991.

Elton, E.J., M.J. Gruber and J.C. Rentzler. "Professionally Managed, Publicly Traded Commodity Funds." *Journal of Business*, 60(1987):175-199.

Elton, E.J., M.J. Gruber and J.C. Rentzler. "The Performance of Publicly Offered Commodity Funds." *Financial Analysts Journal*, July-August 1990:23-30.

Siegel, Sidney. 1956. *Nonparametric Statistics for the Behavioral Sciences.* New York: Mcgraw-Hill.

Snedecor, George. 1946. *Statistical Methods Applied to Experiments in Agriculture and Biology.* Ames, Iowa:The Collegiate Press, Inc.

Table 1: Performance Statistics for Commodity Trading Advisor Index, 1979-1989.

Year	Number of CTAs	Mean Return	Standard Deviation	Sharpe Ratio
		---Percent per Year---		
1979	13	79.957	32.615	2.149
1980	24	55.810	28.450	1.587
1981	45	12.885	20.277	-0.042
1982	64	34.439	16.624	1.469
1983	88	22.056	23.985	0.568
1984	130	22.970	20.506	0.663
1985	175	29.521	17.241	1.281
1986	207	20.022	17.046	0.824
1987	227	36.326	17.250	1.797
1988	230	14.513	18.834	0.443
1989	218	4.725	14.281	-0.232
Averages:				
	1979-89	30.293	21.332	1.015
	1982-89	23.072	17.961	0.862
	1985-89	21.021	16.723	0.863

Table 2: Predictability of CTA Investment Performance, 1979-1989.

Perform. Measure	Year t / Year t+1: 1979 1980	1980 1981	1981 1982	1982 1983	1983 1984	1984 1985	1985 1986	1986 1987	1987 1988	1988 1989	Average Rank Corr.
	Rank Correlations Between Year t and t+1.										
Rate of Return	0.692**	-0.085	-0.075	0.148	0.002	0.234**	0.287**	0.048	-0.020	0.043	0.127
Standard Deviation	0.802**	0.729**	0.699**	0.731**	0.536**	0.699**	0.661**	0.643**	0.659**	0.655**	0.681
Sharpe Ratio	-0.527*	-0.185	-0.092	0.124	0.109	0.244**	0.229**	0.057	0.026	0.106	0.009
Number of Obs.	13	24	45	64	88	124	162	178	196	193	

* - Significant at the 95% confidence level.
** - Significant at the 99% confidence level.

TABLE 3: Predictability of Annual CTA Trading Account Performance Measures When Ranked by D... 1981-1989.

Decile in Year t	Sample Period					
	Rate of Return		Standard Deviation		Sharpe Ratio	
	Average Rank in t+1	Average Return in t+1	Average Rank in t+1	Average Std.[a] in t+1	Average Rank in t+1	Average SR[b] in t+1
		Percent		Percent		
1	2.875	31.588	1.000	8.303	2.625	1.174
2	6.875	14.254	3.000	14.006	4.750	0.693
3	4.875	20.914	4.250	18.919	3.750	0.738
4	4.250	20.012	4.250	19.153	6.625	0.273
5	4.625	17.626	4.875	21.786	5.250	0.474
6	7.875	7.554	5.875	23.289	7.625	0.030
7	6.250	12.253	6.000	22.189	5.875	0.332
8	6.750	12.635	8.250	29.017	7.250	0.184
9	5.875	12.477	8.625	31.021	5.750	0.454
10	4.750	37.508	8.875	36.174	5.250	0.745

a = Standard deviation.
b = Sharpe Ratio.

Endnotes

1. There are an average of 2.3 accounts per CTA in this category.

2. The standard deviation of the index of CTAs will be lower than the average of standard deviations of the individual CTAs. From modern portfolio theory we know that by holding a diversified portfolio of all CTAs for a given year we eliminate diversifiable risk associated with holding a particular CTA. This is assuming that returns for all CTAs are not perfectly correlated.

3. Significance of the rank correlation is tested by the student's t statistic using the following equation (Siegel),

$$t = RC * (((N - 2) / (1 - RC^2))^{0.5})$$