Informational Content in
Historical CTA Performance:

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Abstract

The past decade has witnessed a dramatic increase in the use of public commodity funds as stand-alone investments or as additions to traditional stock and bond portfolios. Research has shown that for investors in stock and bond mutual funds often make selections based on historical return performance. Academic research also suggests that this investor bias toward investment in funds with high historical return results in public commodity funds created primarily from Commodity Trading Advisors (CTAs) who have had high pre-offering return performance.

Previous research concentrates on persistence in pro forma commodity fund returns and post-offering returns. In this paper, the persistence of risk and return performance among Commodity Trading Advisors is assessed. In the following section, we review previous academic studies' results on performance persistence in managed futures (public commodity funds as well as direct investment with CTAs). In section III, the data and methodology are presented. Results are discussed in section IV. The results of this study support previous research on public commodity funds which question the benefit of using past CTA return performance to forecast of future public commodity fund return. The results of this study show, however, that the lack of return persistence noted in previous studies may be because public commodity funds are created from CTAs with high risk-adjusted ex post returns.

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I. Introduction

The past decade has witnessed a dramatic increase in the use of public commodity funds (publicly offered investment vehicles whose investment managers trade primarily in futures and options markets) as stand-alone investments or as additions to traditional stock and bond portfolios. Research has shown that for investors in stock and bond mutual funds often make selections based on historical return performance (Goetzmann et al., 1992).[1] Academic research (Irwin, 1992, Irwin et al., 1994) also suggests that this investor bias toward investment in funds with high historical return results in public commodity funds created primarily from commodity trading advisors (CTAs) who have had high pre-offering return performance.[2]

Previous research concentrates on persistence in pro forma (pre-offering) commodity fund returns and post-offering returns. In this paper, the persistence of risk and return performance among Commodity Trading Advisors (CTAs) is assessed.[3] In the following section, we review previous academic studies' results on performance persistence in managed futures (public commodity funds as well as direct investment with CTAs). In section III, the data and methodology are presented. Results are discussed in section IV. The results of this study support previous research on public commodity funds (Edwards and Ma, 1988, Elton et al., 1989, Irwin, 1994, and Irwin et al., 1992, 1994) which question the benefit of using past CTA return performance to forecast of future public commodity fund return.[4] The results of this study show, however, that the lack of return persistence noted in previous studies (Elton et al., 1989 and Irwin, 1994) may be because public commodity funds are created from CTAs with high risk-adjusted ex post returns.

Earlier research that suggests that a simple CTA market index (e.g., Managed Accounts Report's equal or $weighted CTA index) is an adequate proxy for future CTA returns, and that pro forma return information is not useful. However, this study shows that pre-public offering CTA risk and return performance may be useful in determining the expected risk and return performance of CTA based portfolios. More specifically, if CTA returns are adjusted for relative benchmark risk (e.g., beta), results show a consistent relationship between pre- and post-investment period performance even for CTA portfolios constructed from CTAs with high pro forma returns, as those returns probably reflect an inherently riskier strategy on the part of the CTAs. This is, of course, as expected. For investment portfolios whose historical risk/return characteristics differ from a simple benchmark and yet whose investment strategy is reflective of the benchmark, historical risk adjusted returns will provide a better forecast than a simple benchmark forecast.

One important implication of the results of this analysis lies in the public policy area. In finding that historical CTA performance was a biased predictor of future public commodity fund performance, Edwards and Ma (1988) and Irwin (1994) recommend the CFTC should merely require publication of relevant benchmark indices.[5] In this study, CTA performance, especially at the portfolio level, is shown to be consistent between pre and post investment periods (after adjusting for relative benchmark risk). Public disclosure of individual CTA performance as well as managed futures benchmark information are therefore of benefit to potential investors who desire forecasts of future risk and return parameters.[6]

II. Review of Studies Relating to Consistency of Managed Performance

Considerable research has been conducted on performance persistence in the mutual fund market. While controversy exists, these studies generally find no evidence of consistent superior performance (Brown and Goetzmann, 1995).[7] Studies on public commodity funds as an asset class have generally focused on the performance of public commodity funds as a stand-alone investment and as an addition to portfolios of stocks or bonds.[8] While some research has questions the benefits of public commodity funds (Elton et al., 1987), other recent research suggests that direct investment in CTAs offers diversification benefits (Schneeweis et al., 1992, 1996).

A number of studies (Edwards and Ma, 1988, Elton et al., 1992, Irwin et al., 1992, Irwin 1994) focus on the value of performance information available to investors at the time a commodity fund is created. These results indicate that, while the variance of public commodity fund return is highly correlated over time, there is little persistence in return performance.[9] For instance, Edwards and Ma (1988) computed two data series, the pro forma monthly rate of return for the 36 months prior to going public and the actual monthly rate of return for the 24 months after going public. Edwards and Ma conclude that post-public rates of return are not related to either pre-public returns, fee levels, or certain market conditions in the post-public period. In addition, pre-public risk-adjusted return was not found to have a significant explanatory impact on post-public risk-adjusted return.[10] Elton et al., (1989) and Irwin (1994) support Edwards and Ma, and show that historical CTA returns are substantially inflated relative to post offering public commodity fund returns.[11] As a result, Irwin and Elton et al. conclude that historical CTA returns contain little or no information that is useful in predicting actual public commodity fund returns.[12]

Elton et. al. and Irwin use a simple CTA comparison benchmark to test the relative performance. No adjustments are made for relative risk of the public commodity funds. Edwards and Ma used measures of absolute risk (e.g., standard deviation). However, no attempt was made to test for persistent covariance with the market index. (e.g., beta). In this paper, the persistence of risk/return performance among Commodity Trading Advisors (CTAs) is assessed. Irwin et al. (1994) also concentrates primarily on individual CTAs, and found little evidence of predictability in average returns. In addition, the Irwin et al. analysis not consider the relative impact of CTA portfolio groupings. Schneeweis et al. (1992) and McCarthy et al. (1996) show that CTA portfolios constructed to have low ex ante risk (low beta portfolios), consistently outperform CTA portfolios constructed to have high ex ante risk (e.g., high beta portfolio). This paper follows a similar methodology, with the goal of determining if CTA portfolios constructed to have particular risk characteristics exhibit return or risk persistence.

Prior research has used commodity fund performance as a proxy for CTA performance. However, results obtained for commodity funds may not be applicable to studies of individual CTAs. Many CTAs are not included in public commodity fund offerings. In addition, since many CTAs are in more than one public commodity fund, analysis of public commodity funds may overemphasize CTAs who trade primarily in public commodity funds and ignore those who trade for no funds. To the degree that existing public commodity funds are created primarily with CTAs that have high recent returns, results may be biased toward finding little ex post correlation with prior historical CTA return.[13] These funds may have high pre-investment period abnormal returns and not be well diversified. They may also exhibit subsequent performance below pro-forma portfolio returns.[14] However, public funds constructed with no ex ante abnormal return bias, may exhibit a close pre and post period risk/return relationship.

Public disclosure of individual CTA as well as relative benchmark information may be value if it is used to determine relative risk and return distribution parameters of CTA portfolios or to construct single advisor or multi-advisor CTA portfolios whose risk and return structure differ from that of a common benchmark. For these single advisor or multi-advisor portfolios, past historical returns may be of benefit in determining (1) the extent of historical return abnormalities, so that return adjustments can be made (such as a return estimate equal to CTA portfolio's beta times the benchmark return) or (2) the actual construction of low or high risk CTA portfolios. Given the random error in asset returns, it is anticipated, however, that performance persistence for multi-advisor CTA portfolios would be higher than single advisor CTA.

III. Data and Methodology

This study examines a group of forty CTAs over a nine-year period from 1987 through 1995. Data are segmented into 1-year periods. Three periods, or thirty-six months, are used to estimate risk and return measures. At the end of this three-year period eight equally weighted portfolios containing five CTAs each are created based on some risk or return performance measure. The performance of these portfolios is then tracked over the subsequent twelve months. At the end of the year, portfolios are reshuffled based on the performance of the individual CTAs during the thirty-six months immediately prior. Using this approach, six independent observations are made for each of the portfolio selection criteria, representing years four through nine of the data set. Results are presented as the average performance of a portfolio of these six observations.

Monthly returns and standard deviations of return, as well as deterministic beta adjustment models (Bodie et al., 1993) were determined for each CTA. Return was calculated as follows:

$$R_{i,T} = \left(NAV_{i,T}/NAV_{i,T-1}\right) \quad (1)$$

where,

$R_{i,T}$ = Monthly rate of return for CTA *i* in period *T*
$NAV_{i,T}$ = Net asset value for CTA *i* in period *T*

The standard deviation of monthly return is determined at the individual and CTA portfolio level. A simple deterministic beta adjustment suggested in popular investment texts is used. This beta adjustment is:

$$b_{adj} = \frac{1}{3} b_m + \frac{2}{3} b_i \quad \text{where } b_m = \text{ average Beta} \quad (2)$$

Results are presented for the forty individual CTAs and eight equally weighted portfolios. Portfolios are based on ranking individual CTAs during a thirty-six month pre-investment period. Selection criteria include monthly return, standard deviation, and beta. Random selection is also used for comparison. Results are reported for the following portfolio characteristics:

(1) Following methodology in Elton et al. (1989), and Irwin (1994), we report Spearman rank order correlation between pre-selection return, beta, standard deviation and risk-adjusted return and post-selection return.

2) Correlation between pre-selection and post-selection risk, as measured by standard deviation, Sharpe ratio, and Treynor ratio.

(3) Mean error and mean absolute error of return forecasts. Portfolio returns are forecast using a number of common methods, including naive (portfolio return in the next period will be the same as the previous period), naive market (portfolio return in the next period will be the same as the average return of all CTAs in the prior period, as measured by MARCTA$, the MAR CTA dollar-weighted index), simple market model (portfolio return in next period will equal the prior period MARCTA$ index times the portfolio beta), and adjusted market model (market model using adjusted beta (2)).[15] The formula for each of the mean absolute error metrics follows: (Mean error uses the same calculations, but without the absolute value function.)

$$MAER_{i,T} = \text{ABS}\left(R_{i,T} - R_{i,T-1}\right) \tag{3}$$

$$MAEcta\$_{i,T} = \text{ABS}\left(R_{i,T} - MARcta\$_{i,T-1}\right) \tag{4}$$

$$MAEb_{i,T} = \text{ABS}\left(R_{i,T} - MARcta\$_{i,T-1}\, b_{i,T-1}\right) \tag{5}$$

$$MAEb_{ADJ\ i,T} = \text{ABS}\left(R_{i,T} - MARcta\$_{i,T-1}\, b_{ADJ\ i,T-1}\right) \tag{6}$$

A perfect forecast (or foresight) model assumes the performance of the market index in the next period is known. Forecasts of next period's portfolio performance are made using the next period's index as opposed to the most recent period's index. Perfect forecast versions of equations (4), (5), and (6) are constructed by replacing $MARcta\$_{i,T-1}$ with $MARcta\$_{i,T}$.

IV. Results

1. Cross Period Risk and Return Correlation

If information in historical CTA returns is useful, persistence in relative risk and return patterns should be observable in historic data. If there is no value in studying historical returns, there should be no meaningful correlation in performance from period to period. Portfolios are created in order to reduce the degree of random error. By reducing the sample size from 40 CTAs to 8 portfolios, larger Spearman rank correlation coefficients are likely to be observed in portfolios even if the data have no persistence. For this reason randomly selected portfolios are created as well as portfolios based on some aspect of historical performance. Results in Table 1a show that individual CTAs and randomly constructed portfolios of CTAs have correlations between pre-selection return, standard deviation, and beta[16] and post-selection return are below 0.35.[17] Correlations for portfolios created by ranking CTAs on pre-investment period return are also very low.

One reason for the low correlation between (as measured by beta) and subsequent return is that the betas of return-ranked portfolios are very similar.

Earlier studies (Elton et al., 1992) relied on commodity fund performance data as opposed to individual CTAs. These studies report low correlation in returns for commodity funds. Results presented here are consistent with these earlier studies, as there is no evidence that individual CTAs, randomly selected portfolios, or portfolios created based on historical return ranking show persistent performance.

Insert Table 1a and Figure 1 About Here

When portfolios are formed based on historical beta or standard deviation, the correlation between pre-selection risk measures and post-selection return ranges from .25 and .42. When risk is the predictor, relatively higher correlations are reported for portfolios based on historical risk than random or return-ranked portfolios.

b) Cross Period Risk Correlation

Table 1b indicates a there is a high correlation between pre-selection and post-selection standard deviation. Individual CTAs and randomly and return-ranked portfolios have rank correlations in the 0.50-0.55 range, while standard deviation and beta-ranked portfolios have correlations of 0.84* and 0.90**, respectively. This is similar to the significant correlations between pro-forma and post offering public commodity fund standard deviations previously reported (Irwin et al., 1992).[18] As in Table 1a, the correlations are lowest for randomly selected CTA portfolios and highest for multi-advisor portfolios constructed to differ by risk class.

Insert Table 1b and Figure 2 About Here

Results in Tables 1a and 1b indicate, in contrast to previous studies, that the performance of CTA portfolios may show persistent risk and return relationships. The principal difference between past studies and this analysis is that when risk measures determine portfolio construction, the correlation between pre-selection risk and post-selection return is about 50% larger than randomly selected or return-ranked portfolios. While not statistically significant due to the small sample size, this provides some indication that reporting CTA performance measures and/or managed futures benchmarks can be used to determine historical risk characteristics. Results also clearly indicate the persistence in CTA risk characteristics..

c) Cross Period Risk-Adjusted Return Correlation

Table 1c reports the Spearman rank correlation between risk-adjusted returns for CTA portfolios. Individual CTAs and randomly selected portfolios show no correlation in Sharpe or Treynor ratios over time, while portfolios selected based on beta, standard deviation, and return show correlations in Sharpe ratio between 0.26 and 0.39. This result is unsurprising. To the degree that standard deviation and/or beta provides adequate risk class determination, the correlation between risk adjusted measures of risk is expected to be low. Differences between pre and post investment risk-adjusted return should be random.[19]

Insert Table 1c and Figure 3 About Here

2. Mean Forecast Error

Benchmark Return Estimate

Previous research (Elton et al., 1992, Irwin, 1994) indicates that pro forma public commodity fund returns are an upward biased forecast of post-offering returns. Irwin suggests a benchmark index would offer a superior forecast of future returns than a pro forma historical record of the CTAs who will participate in the fund . Results in Table 2 support these findings. In Panel 2a, it is shown that a portfolio comprised of the five CTAs with the highest pre-selection return would have underperformed the pre-selection return by an average of -2.92% per month in the following year. A portfolio of the five worst CTAs would have outperformed pre-selection average return by 1.41% per month.[20] However, when a CTA benchmark index such as the MARCTA$ index is used as a forecast for the next period's return, the mean error of the high return portfolio is reduced from -2.92% to .16% and the error of the low return portfolio is reduced to -0.24% from 1.41%. This supports Irwin's (1994) suggestion that an index is a better forecast of a fund's return than the historical records of the CTAs. Results in Table 2a also suggest the benchmark forecast provides a lower mean error than a beta adjusted forecast (-1.19%) if the CTA portfolio has been constructed to have high historical return.

Insert Tables 2 and Figure 4 About Here

Portfolio Construction/Return Forecast

The impact of CTA portfolio construction is also evident in Table 2. For CTA portfolios constructed after ranking CTAs by beta (Panel 2c) and using pre investment period return as the return forecast, the average mean return error (-1.25) is less negative than the high return-ranked CTA portfolio (-2.92%). Similarly, using pre investment period return as the return forecast, the average mean return error is closer to zero (-.36) than the low return-ranked CTA portfolio (1.41%). However, CTA portfolio construction has seemingly little impact on the mean error forecast for CTA benchmark or market model based CTA return forecasts. For CTA portfolios determined using CTA beta rankings, the high beta portfolio underperforms the low beta portfolio on a simple return basis and with a market model forecast (beta and beta-V) but outperforms the low beta portfolio when the unadjusted benchmark (CTA Index) is used as a forecast of the next periods return.

A simple naive (historical) return prediction model may bias the CTA benchmark and beta based mean squared errors. If the following periods return is negative (security and benchmark), while the pre investment periods benchmark used to forecast the return is positive, the high beta forecast (B*Rmt) will overestimate next period negative return. In contrast, if the actual benchmark return in the following period is used (B*Rmt+1), the negative return bias from using an inaccurate benchmark return forecast would be removed. As shown in Table 2a or 2b, when the actual benchmark return is used in the actual investment period (e.g., perfect forecast), the negative mean return error is reduced in the high return-ranked and beta-ranked portfolios for beta forecasts (-.72% and -.87% respectively), as compared to the naive forecast (-1.18% and -1.49% respectively).

Bayesian Adjustments to Beta

The beta adjustment (beta-V, equation 2) reduces the mean error relative to the simple beta based forecast. When a naive forecast is used, the error for the low (high) beta portfolio is reduced from .699% to .32% (-1.49% to .84%). When a perfect foresight model is used, the error for the low (high) beta portfolio is reduced from .67% to .367% (-.877% to .-.357%). There are several plausible explanations for this. Beta has considerable estimation error. Previous research has indicated a negative correlation between estimated beta and true beta; that is, high (low) betas may overestimate (underestimate) the true beta.[21] Thus Baysian models which adjust the beta toward a central mean may result in reduced error forecasts. This hypothesis is supported by the results in Table 2.

4. Mean Absolute Forecast Error

In the previous section mean error forecasts were shown to be influenced by portfolio construction. However, the mean return error metric in Table 2 does not contain information about the dispersion of forecast errors.. In Table 3 we report the mean absolute forecast error (MAE) over the six investment periods. Several results are evident. First, for the naive forecast high risk and return portfolios, the simple benchmark forecast provides the lowest MAE for portfolios determined from return (1.09%) or beta rank CTA selection (1.20%), while for standard deviation ranked CTAs, the use of the portfolio return provides the lowest MAE (1.27%). Moreover, the beta-based forecast results in higher MAE than the simple benchmark forecast (return ranked, 1.09%/1.30%; beta ranked, 1.20%/1.55%; standard deviation ranked, 1.31%/1.49%). As in the previous section, adjusted beta (beta-V) consistently outperforms the simple beta model The simple benchmark forecast appears to be superior to historical return forecast for a CTA portfolio created to have high returns. However, if the CTA portfolio is constructed to represent a particular risk class (e.g., standard deviation), the portfolio's historical return may provide a more consistent forecast than the CTA benchmark.

Perfect forecast reduces the MAE forecast for the high return, high beta, and high standard deviation portfolios (except for the return-based forecast, which is independent of the index). For example, the MEA of the high return portfolio index forecast declines from 1.09% to .89% for the index model, from 1.30% to .88% for the beta model; and 1.15% to .81% for the adjusted beta model.[22] Standard deviation and beta ranked CTA portfolios have similar patterns. For the low risk and return portfolios, the beta forecast consistently outperforms the simple benchmark forecast across all CTA portfolio construction methods and the beta adjustment forecast outperforms the simple beta forecast. For instance, the low return CTA portfolio, has benchmark MAE of 1.16%, beta of 1.10%, and beta adjusted of 1.08%. Similarly, , the high return CTA portfolio, has benchmark MAE of .89%, beta of .88%, and beta adjusted of .81%. Thus when a perfect benchmark forecast is assumed, beta-based forecasts outperform the benchmark forecast and the beta adjusted forecast outperforms that of the simple beta based forecast.

Insert Table 3 about here

As is true with analyzing stock portfolios, the results reported in Tables 2 and 3 may be due to the choice of a particular benchmark, in this instance the MAR dollar-weighted CTA index. A CTA benchmark that more closely represents the underlying CTA portfolios may provide different results.

Insert Table 4 and 5 About Here

Results in Tables 4 and 5 repeat the analysis in Tables 2 and 3 using the MAR Diversified CTA subindex as the market index instead of the MARCTA$. The individual CTAs used in this analysis are listed as diversified CTA traders by MAR and thus the performance of the diversified subindex may better reflect their performance. Results in Table 4 are consistent with results in Table 2. Mean forecast errors differ somewhat, but not in a consistent fashion. Results in Table 5 are also consistent with those in Table 3. In low and high risk (return) portfolios, beta or standard deviation-ranked CTA portfolios had mean absolute return errors less than those obtained when portfolios are created after ranking on CTA return. The beta adjusted mean absolute forecasts were consistently superior to the simple beta based forecasts when either historical or perfect forecasts.

There is one notable difference between the results using MARCTA$ and those that use the MAR diversified CTA subindex. In Table 5, the naive forecast for beta and standard deviation-ranked portfolios shows that both the low and high return portfolios have beta-based MAE forecasts that are less than the simple benchmark forecast. In Table 3, the benchmark forecast had smaller errors than the beta-based ones. The use of a benchmark which is more closely related to the underlying CTAs may result in beta forecasts with less random error, such that lower MAEs are obtained. Thus determination of suitable benchmarks is a required area of future research.

V. Conclusions

Previous research has questioned the use of historical CTA performance returns in pro forma public commodity fund statistics as indicative of future returns. The results of this analysis support earlier studies' conclusions that past returns of the commodity trading advisors (CTAs), who are combined to form the prospective public commodity fund, may provide an upward bias estimate of post offering pubic commodity fund returns. However, in contrast to earlier studies' results, in this study the extent of this bias is shown to depend on the form of CTA selection and the measurement of risk and return persistence. In short, if pro forma pubic commodity funds have pre-offering returns, then post-offering public commodity fund returns may underperform relative to pro forma return estimates. However, if CTA returns are adjusted for market risk (e.g., beta), results show a more consistent relationship between pre- and post-investment period performance.

Past CTA performance is shown to be valuable in determining CTA and multi-advisor CTA portfolios risk parameters, especially at the portfolio level.

In terms of public policy, public disclosure of individual CTA as well as relative benchmark information may be of benefit to investors who desire to forecast expected risk-adjusted public commodity fund performance. At both the single advisor level, and more importantly at the portfolio level, results indicate that CTAs' previous periods risk and return performance may be useful in determining the expected risk and return performance of portfolios of CTAs. While past performance of constructed public commodity portfolios may result in biased pro forma returns, the reasons for this result are found in the basis of construction (e.g., selection of CTAs with high historical abnormal returns). Thus portfolios constructed without this implied bias - randomly or with a unique risk classification - report no such bias. As important, the accuracy of market model forecasts are dependent on the index used. An index based on a group of CTAs with a similar trading style to the CTAs analyzed in this study is shown to provide more accurate risk-adjusted forecasts than an a broad CTA performance index.

Results indicate that investors can compare the actual return of the pro forma portfolio to the market-adjusted return in the historical time period. Previous return information can therefore be of value in determining the distribution of futures risk and return, but must be adjusted to account for selection bias. Pro forma fund performance should continue to be reported. However, greater emphasis should be placed on measures that more adequately forecast the expected risk and return of single advisor or multi-advisor portfolios, and less emphasis on naive projection based on historical returns.

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[1] See Brown, S. and W. Goetzmann [1994] for a summary of academic research on the persistence of performance among equity mutual fund managers and D. Chance [1994] for persistence of performance among CTAs.

[2] Edwards and Ma [1988], Irwin [1994], Elton et al., [1989, 1992].

[3] This study uses CTAs for whom consistent data existed for the period 1987-1995. As a result, survivor bias is present in these results. However, a previous study (Schneeweis et al., 1995) performs tests similar to those presented in this paper for a data set of CTAs form in 1987 and tracked until 1991. Tests were also run on portfolios which included CTAs who dissolved during the period. The results of that study, which considered the impact of survivor bias on empirical results, are similar and are available from the author(s).

[4] A public commodity fund construction issue affecting public commodity fund performance and historical CTA performance, is that public commodity funds may be constructed to exhibit high ex post returns. To the degree that CTAs included in these funds, obtained high ex post historical returns due to similar style or product emphasis, a public commodity funds so constructed may not be well diversified and may exhibit ex post performance which is not consistent with implied historical performance. Moreover, previous results which concentrated on such portfolios would not be consistent with results for CTA portfolios constructed based on other constraints (e.g., low risk).

[5] See Schneeweis et al. (1996) for a comparison of various managed futures and CTA benchmark indices. Results show that available public indices vary in construction and relative performance.

[6] In supporting the benefits of past CTA performance information in assessing future performance (especially for public commodity funds), it is assumed that the investor will make proper adjustments for differential management fees and performance costs. In addition, to the degree that the listed CTAs historical performance shows evidence of high abnormal returns (e.g., after adjusting for risk) investors may simply wish to use a market based regression model to forecast future returns.

[7] In contrast, Grinblatt and Titman [1992] find evidence of superior performance persistence. Using a data set resonably free of survivalship bias, Brown and Goetzmann [1995] have argued that relative risk-adjusted performance of mutual funds persists from year to year but absolute performance, as measured by positive alphas, does not.

[8] These studies have concentrated either on the performance of public commodity funds and funds (Elton, Gruber and Rentzler [1987,1990]; Irwin, Zulauf and Krukemyer [1992]) or multi-advisor CTA portfolios (e.g., commodity trading advisors (Schneeweis, Savanayana and McCarthy [1992]).

[9] While not addressed in this study, Monte Carlo simulation analyses on the stability of return and variance drawn from stable distributions indicates that for repeated drawings reported variance is stable, however, wide deviations in ex post return performance is evident (Kazemi [1996]).

[10] It is important to note that this risk adjustment was conducted using standard deviation and not a benchmark (e.g., beta) adjustment. For traditional equity research. Lehman and Modest [1987] have demonstrated the importance of alternative benchmark determination. Research into the impact of various CTA benchmark indices on beta forecasts is presently being conducted (T. Schneeweis and R. Surgin, "Analysis of Benchmark Classifications for Managed Futures" (CISDM, University of Massachusetts-Amherst, 1996).

[11] Elton et al., report a between period rank order correlation at the public commodity fund level of only .053. Likewise for public commodity funds, Irwin et. al., find correlations of between period returnsreturns between +.10 and -.10. Only for standard deviation was the correlation between periods (.45) significant.

[12] However, in later research, Elton et al., [1992] also pointed out that for a limited sample, funds managed by partners with above average (relative to the sample) prior fund performance outperformed those managed by partners with previous below-average prior experience. Furthermore, this indication of possible performance persistence among public commodity funds, however, requires information not directly contained in the public commodity fund prospectus.

[13] For public commodity funds, for fund marketing purposes, fund managers may concentrate on CTAs with high historical return. To the degree that these above average returns are not due to CTA skill, then reversion to the mean in following historical periods may result in a poor correlation between historical and post offering performance. Given the high performance fees in public commodity funds, fund managers may require high exante CTA performance order to cover potential costs and offer to investors a

return commensurate with alternative risky investment vehicles. The low risk CTA managers (e.g., market neutral) may be underrepresented in public commodity funds.

[14] It is important to note that the authors of this paper do not reject the findings of the earlier research of Elton et. al., or Irwin. In fact the results of this paper, conclude that for CTA portfolios which were constructed randomly and thus have the same risk as the overall sample, then use of a common benchmark portfolio would be an adequate alternative to pro-forma historical CTA returns. Moreover, the cited benchmark would be superior in the case where CTAs were selected on the basis of high abnormal returns and the risk of the constructed CTA portfolio was equal to that of the cited benchmark.

[15] Analysis of the various beta adjustments provides evidence on the importance of correcting parameters of the benchmark risk model for possible estimation error (Bawa et. al., [1979]).

[16] Correlations for adjusted beta (Beta-V) are also reported. Since the beta adjustement is a linear transformation, the correlations for adjusted beta are the same as for beta.

[17] Due to the small sample size, correlations must be above 0.77 for 95% confidence that the correlation is different from zero (*), and must exceed 0.88 for 99% confidence (**).

[18] Due to the short post-selection investment period (six months), the correlation between pre and post betas was not reported, and we assume a constant beta. However, when tests were conducted over longer post investment periods (e.g., three years), results indicate that standard deviation dominates as a risk and return predictor, while for shorter periods, beta is superior. Since these results are only independent for one period the results are not represented in this paper. However, they are consistent with a CTAs changing risk posture over time in regard to relative market movements but with a consistent overall risk exposure. Results are available from authors.

[19]Results in Table 4 also show the importance of rank based correlation measures for risk-adjusted measures that can be affected by small denominators. For instance, for portfolios created by ranking on beta,risk-adjusted returns correlations had Pearson correlations of approximately .78.

[20] This latter result is questionable because of the possibility of survivor bias. Schneeweis, Spurgin, and McCarthy [1996] show that CTAs whose performance is consistently poor have a high probability of failure. Since all the CTAs in this analysis survived, it is probably because their performance improved. If nonsurviving CTAs had been included, the worst-performing CTA portfolio would not, in all likelyhood, have performed as well.

[21] Various beta adjustment techniques have been suggested to correct for this estimation error [Bodie et al., 1993]. in Schneeweis et al. (1995) other baysian beta adjustment models (e.g., Vasicek) are used with similar reuslts.

[22] The importance of the use of a perfect forecast is seen in that for two of the eight periods, the investment period had a negative market return (periods 2 and 4). As a result use of a beta adjustment and a pre investment period return forecast which is positive, results in a large difference between forecast and actual return. In fact, a CTA with a high beta would be expected to have a high negative market return in a down market compared to a simple benchmark forecast.