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THE PREDICTABILITY OF COMMODITY TRADING ADVISOR RETURNS

by

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THE PREDICTABILITY OF COMMODITY TRADING ADVISOR RETURNS

Abstract

This study investigates the performance and predictability of returns generated by advisors to Commodity Trading Funds from 1979 through 1989. Rates of return and Sharpe Ratios show evidence of predictability from one year to the next for all Commodity Trading Advisors (CTAs). Returns for the top one-third and top 5 performing CTAs show more predictability than for all CTAs.

THE PREDICTABILITY OF COMMODITY TRADING ADVISOR RETURNS

Introduction

Commodity marketing is an important activity for virtually all agricultural **producers**. In a recent survey (Smith), 80 percent of producers indicated that marketing decisions **were** either important or very important to their financial success. This survey also **high**lighted the growing role of market advisory services. Sixty-six percent of producers indicated **they** had used a market advisory service. Also, out of eleven 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 carefully follow their trading **recomm**endations. A relatively new trend is for producers to turn hedging decisions over to a market **adv**isory service (Faivre). In this capacity, the market advisory service, formally referred **to** as a Commodity Trading Advisor (CTA), is responsible for marketing and 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 the education, experience, and personal integrity of the principal **part**ners of the firm. However, the primary consideration is likely to be the CTA's expected **trading** record. Producers will presumably choose a CTA that will maximize returns **subject** to the risk they are willing to assume in the hedging operation. Since future returns are **unk**nown, the ability to predict future returns becomes an important consideration in evaluating CTAs.

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.

This study will provide a comprehensive test of the predictability of CTA performance by using a data base composed of the monthly returns for 363 CTAs trading accounts. This data has been made available by A.T.A., Inc., a private firm specializing in the analysis of the performance of CTAs. The period examined is January 1979 through December 1989. The predictability of CTA returns will be evaluated by first calculating correlation coefficients between the average annual returns of CTAs in adjacent paired years, for example 1988 and 1989. Correlation coefficients also were calculated between risk associated with monthly returns of CTAs in adjacent paired years. Both of these two analyses were conducted on different sets of CTAs. Last, returns were calculated for CTAs divided into various groups based on returns from the prior year. The latter provides an economic evaluation of the question whether high performing CTAs in one year continue to out-perform the average of all CTAs in the next year.

Based on this analysis, producers will gain information crucial to the decision of selecting a CTA for hedging purposes. Researchers and regulators will gain important insights regarding the forecasting ability of private traders and the efficiency of futures markets.

Commodity Trading Advisor Returns

Data

The A.T.A. data base includes only those CTAs managing funds for outside investors. CTA trading accounts are determined by CTA and trading strategy. Returns for CTAs trading more than one account, but using similar trading strategies for all accounts, are compiled into a composite return for the CTA. Of the 363 CTA trading accounts in this study, 252 have a single account or a composite account return. If the CTA has more than one trading account but use different trading strategies, returns are calculated for each trading account using a different trading strategy. Multiple accounts were compiled for 49 CTAs, resulting in 111 trading accounts.

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 may be received by mail or fax on a monthly basis, and/or (5) industry newsletters when data is unavailable from other sources.

The database covers advisors both currently in operation and ones that are not. Reasons why return data may have ceased for a particular CTA trading account are: (1) the advisor went out of business, (2) the particular trading program 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 CTAs trade a highly diversified portfolio across many different markets, while 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 CTAs entering and exiting 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.

Trading Results

CTA returns were calculated in logarithmic form to obtain continuously-compounded returns. The annual mean, standard deviation, and Sharpe Ratio of the CTA returns are presented in Table 1. (These measure of performance are defined in the Appendix.) The number reported for each statistic and year is the average across all CTAs included in a given year. For example, the mean annual return in 1979 (79.957 percent) is the simple average of the annual returns of the 13 CTAs included in the 1979 data set.

During the eleven years from 1979 to 1989, annual CTA returns were highly variable. Average CTA returns ranged from a high of 79.957 percent in 1979 to a low of 4.725 percent in 1989. The 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 between 1982-89 and 21.021 percent between 1985-89.

Standard deviation is calculated as the standard deviation of monthly returns, which in turn is annualized. The average monthly standard deviation from 1979 to 1989 was 41.023 percent per year. 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. The Sharpe Ratio is found by first subtracting the riskless rate of return (T-bill rate) from the average return of the CTA. This "excess" rate of return is then divided by the standard deviation of the CTA returns to obtain a standardized measure of return-risk tradeoffs. As a result, the higher the Sharpe Ratio the better is the return-risk performance of CTAs. Sharpe Ratios for CTAs also are presented in Table 1. The Sharpe Ratio of CTAs for the entire sample period is 0.152. By comparison, Irwin, Krukemyer, and Zulauf find that common stocks have a Sharpe Ratio of 0.161 over the same sample period. Hence, the stand-alone performance of CTAs over the full sample is comparable to that of common stocks. This is not the case, however, for the two sub-periods. The Sharpe Ratio for CTAs in the 1982-

89 sub-period is 0.110 while common stocks outperform them with a 0.196 Sharpe Ratio. During the 1985-89 sub-period, the Sharpe Ratio for common stocks is 0.224, far superior to CTA's Sharpe Ratio of 0.118.

The Predictability of Commodity Trading Advisor Returns

Correlation Results

To determine whether CTAs that have high returns or risks in one year also tend to have high returns or risks in the following year, correlation coefficients between returns or risks for all adjacent years were calculated. To illustrate, consider the case of CTA returns in 1979 and 1980. First the annual returns of each CTA in 1979 (year t) are paired with their annual returns in 1980 (year $t+1$). The correlation between these paired returns for 1979 and 1980 is calculated. Correlation between all paired year observations were calculated for all CTAs. Correlations also were calculated for CTAs stratified as follows based on their performance in year t : top five and top, middle, and bottom thirds.

Results of the correlation analysis are presented in Figures 1 through 10. These figures present the scatter plot of paired year t and year $t+1$ for return or risk for each category of CTAs. Also presented in the figures are the correlation coefficient and the best fitted line relating year t and year $t+1$ return and risk. Perfect predictability also is indicated by a line with an intercept of zero and a slope of one. Note that the correlation coefficient can range from -1 to +1 with +1 being perfect positive correlation indicating perfect predictability.

Figure 1 shows that annual CTA return displays some evidence of predictability for the entire sample. The correlation coefficient is 0.25. Correlations of 0.31 and 0.40 for the top 5 and top third categories, respectively, show more predictability exists for the higher performing CTAs than for the entire sample. In contrast, the middle and bottom thirds show no discernible predictability, having correlations of 0.10 and 0.00, respectively. The fitted lines for the entire sample, top third, and top 5 have equations that give supporting evidence for predictability in these samples.

For the standard deviation analysis, the top one-third category includes CTAs with the lowest standard deviations in year t , and the bottom one-third category includes the CTAs with the highest standard deviations in year t . Figures 6 through 10 indicate a much higher degree of predictability for the standard deviation of CTA returns than for the level of annual CTA return. The entire sample has a correlation coefficient of 0.5703. The sub-categories also show strong predictability with correlation coefficients of 0.37, 0.16, 0.42, and 0.39 for top third, middle third, bottom third, and top five, respectively. The scatter plots and the equations for the fitted lines corroborate this evidence of predictability. The relatively high predictability for standard deviation is expected because CTAs use similar trading strategies from one year to the next.

The Sharpe ratio incorporates rate of return and standard deviation into a single value. The entire sample reveals evidence of predictability with a correlation coefficient of 0.22. There is a higher degree of predictability for the top one third and top 5 groups as their coefficients are 0.37 and 0.59 respectively. The scatter diagrams and fitted lines strongly support this high degree of predictability in these two sub-categories. The middle and bottom third show little to no predictability with correlation coefficients of 0.12 and 0.03 respectively.

Return and Risk of the Selection Strategies

To further investigate the predictability of CTA returns, return and risk of a naive strategy of randomly selecting a single CTA was compared the return and risk based on strategies of selecting only high performing CTAs. High performing CTAs were identified as being among the top 5 and top one-third of all CTAs trading in the year. The average return and Sharpe Ratio for these high performing CTAs in the following year was calculated and compared with the average return and Sharpe Ratio for all CTAs in the following year. This procedure provides evidence of regarding the economic significance of the correlations presented in the previous section.

For the 1979-1989 period, average rates of return are 25.327, 29.232, and 60.768 percent for the entire sample, top one-third, and top five samples of CTAs, respectively. There is little difference between the average return based on randomly-selecting a single CTA and picking a CTA from the top third sub-sample. However, choosing a CTA from the top 5 sample will give an investor a rate of return of 60.768 percent compared to the average return of 25.327 percent. The 1982-89 sub-period shows a greater incentive to invest in the top 5, as the top 5 had a mean return of 71.208 percent compared to the average return of 23.072 percent. The top third does not differ that much from the average time period, nor does it in the 1985-89 sub-period. The top 5 category once again proves to be superior to the average in the 1985-89 sub-period, although to a lesser extent than the 1979-89 and 1982-89 periods.

Sharpe ratio results are similar to those based on the rate of return. For the 1979-1989 period, Sharpe Ratios for the entire sample, top third, and top 5 are 0.118, 0.134, and 0.308 respectively. This superior performance by the top 5 CTAs in year $t+1$ is supported in the two sub-periods. In the 1982-89 sub-period the entire sample has a Sharpe Ratio of 0.110, and the top 5 sample has a Sharpe Ratio of 0.358. The top 5 sub-sample has a Sharpe Ratio almost five times as large as the entire sample in the 1985-89 sub-period.

Summary and Conclusions

This study provides a comprehensive study of the predictability of CTA performance. The database contains 363 CTAs trading accounts over an eleven year period, 1979-1989. In terms of annual rate of return, the top 5 CTAs appear to have the highest degree of predictability from year to year. Predictability of returns also was found for the entire sample as well as the top one-third of CTAs. Mean rate of return comparisons reveal that there is an incentive to invest in the top 5 CTAs, as they consistently and substantially outperform the entire sample of CTAs across all time periods.

Similar to previous studies, this study found standard deviation to exhibit the highest degree of predictability from year to year. This is to be expected, as CTAs tend to use similar trading strategies from year to year. Correlation coefficients were highest for the entire sample, top one-third, and top 5 groups. It appears that investors seeking a CTA with lower risk for period $t+1$ will have some success by picking CTAs with low standard deviations in period t .

Sharpe Ratios display predictability from period t to period $t+1$ for all categories except the bottom one-third category. The correlations for the top one-third and top 5 sub-categories give strong signals of predictability for higher performing CTAs in terms of return and risk. Sharpe ratio comparisons reveal that the top 5 sub-sample of CTAs outperform the entire sample across all time periods.

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 with some degree of predictability a CTA that will profitably manage their hedging account.

Appendix

Monthly Rate of Return is defined as follows:

$$[\text{UV}_{t+1})/\text{UV}_t] - 1$$

where: UV_t is the unit value of the CTA trading fund at the end of month t.

Standard deviation for a given year is defined as follows:

$$[(\text{SUM } (R_i - R_x)^2)/(n - 1)]^{1/2}$$

where R_i is the rate of return in month i

R_x is the average monthly rate of return for the year

n is the number of observations in the annual sample period (i.e. 12).

Sharpe ratio is defined as follows:

$$R_c - R_f / s_c$$

where R_c is the expected rate of return of the financial instrument

R_f is the risk-free rate (Treasury-bill)

s_c is the standard deviation of the financial instrument.

Correlation coefficient is defined as follows:

$$\text{Cov } (R_t, R_{t+1}) / (s_t \times s_{t+1})$$

where R_t is the rate of return in year t

s_t is the standard deviation of rate of return in year t.

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

Year	Number of CTAs	Mean Return	Standard Deviation	Sharpe Ratio
---Percent per Year---				
1979	13	79.957	47.994	0.488
1980	24	55.810	50.164	0.255
1981	45	12.885	47.535	0.050
1982	64	34.439	38.341	0.152
1983	88	22.056	43.599	0.038
1984	130	22.970	40.979	0.101
1985	175	29.521	39.096	0.182
1986	207	20.022	41.489	0.088
1987	227	36.326	38.943	0.240
1988	230	14.513	32.783	0.091
1989	218	4.725	30.325	-0.012
Average:				
	1979-89	30.293	41.023	0.152
	1982-89	23.072	38.194	0.110
	1985-89	21.021	36.528	0.118

Table 2: Rates of Return and Sharpe Ratios for the Next Year (Year t+1) Categorized by Performance in the Prior Year (Year t), Various Sample Periods, 1979-1989.

Sample Period	Rate of Return			Sharpe Ratio		
	Entire Sample of CTAs	Top One-Third CTAs	Top Five CTAs	Entire Sample of CTAs	Top One-Third CTAs	Top Five CTAs
	---Percent per Year---					
80-89	25.327	29.232	60.768	0.118	0.134	0.308
82-89	23.072	27.456	71.208	0.110	0.138	0.358
85-89	21.021	21.648	49.848	0.118	0.146	0.503

Fig.1: Predictability of CTA Returns All CTAs, 1979-1989

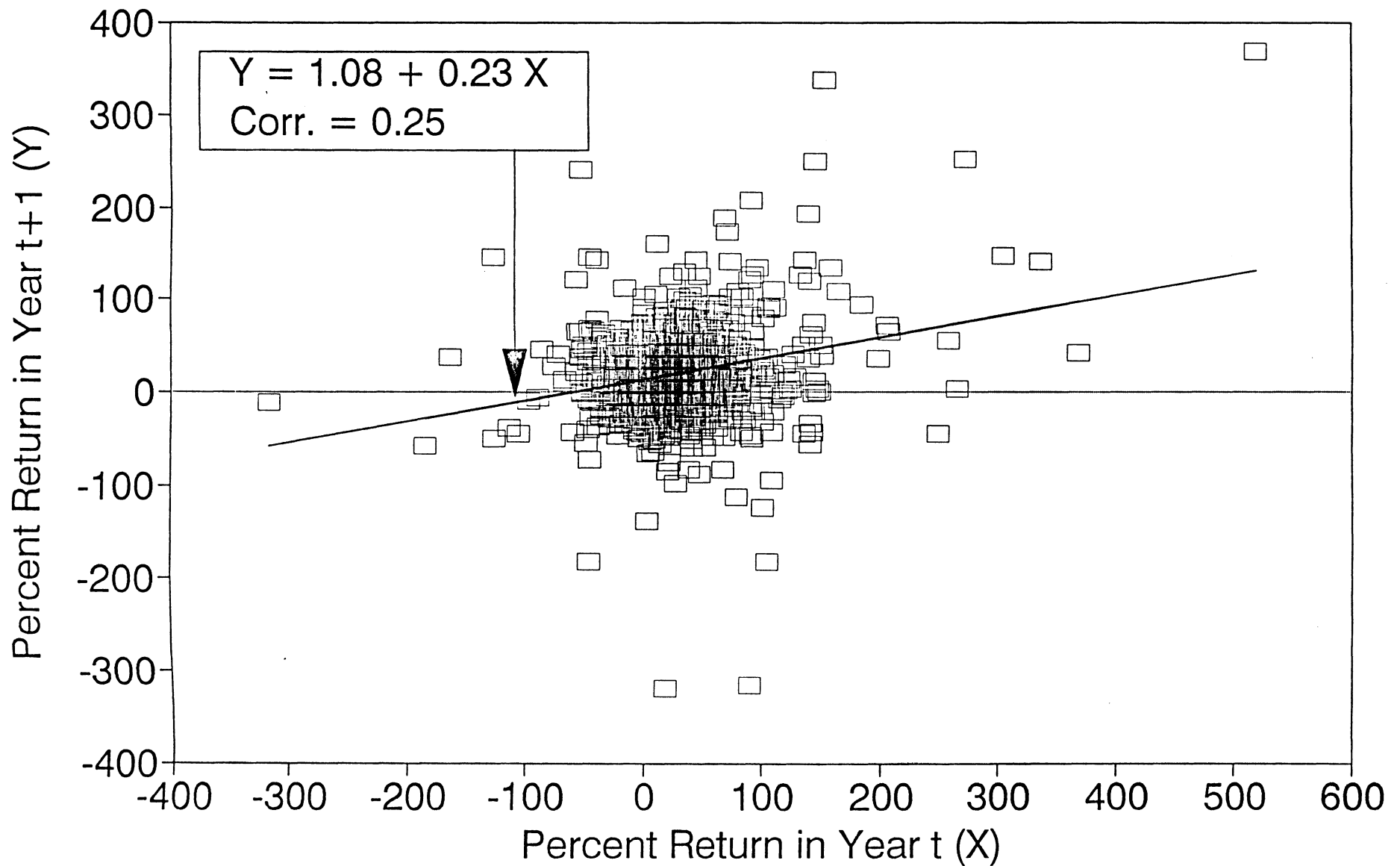


Fig.2: Predictability of CTA Returns
Top 1/3 CTAs, 1979-1989

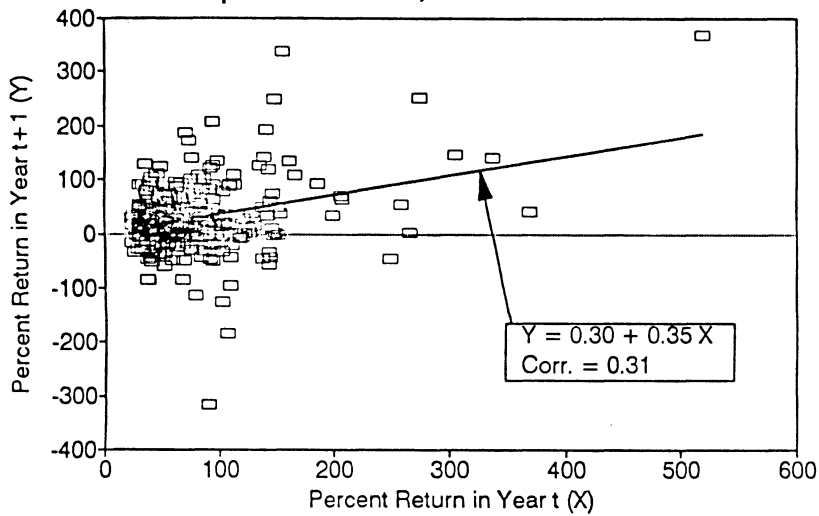


Fig.3: Predictability of CTA Returns
Middle 1/3 CTAs, 1979-1989

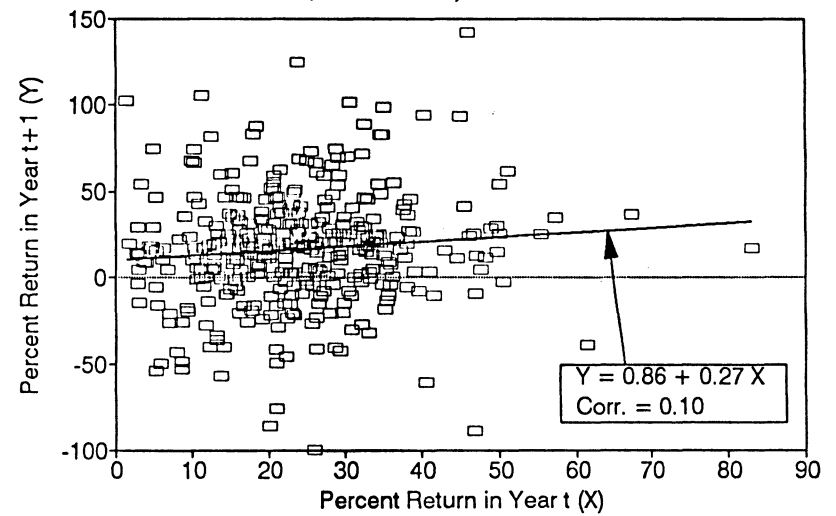


Fig.4: Predictability of CTA Returns
Bottom 1/3 CTAs, 1979-1989

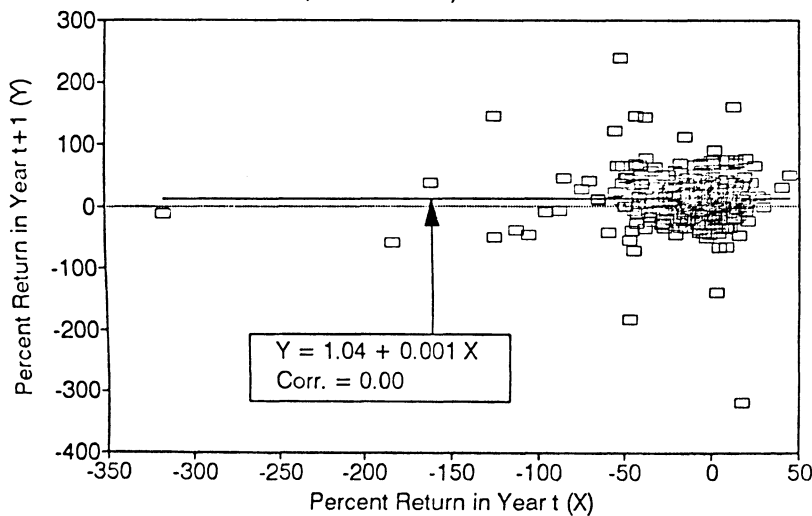


Fig.5: Predictability of CTA Returns
Top 5 CTAs, 1979-1989

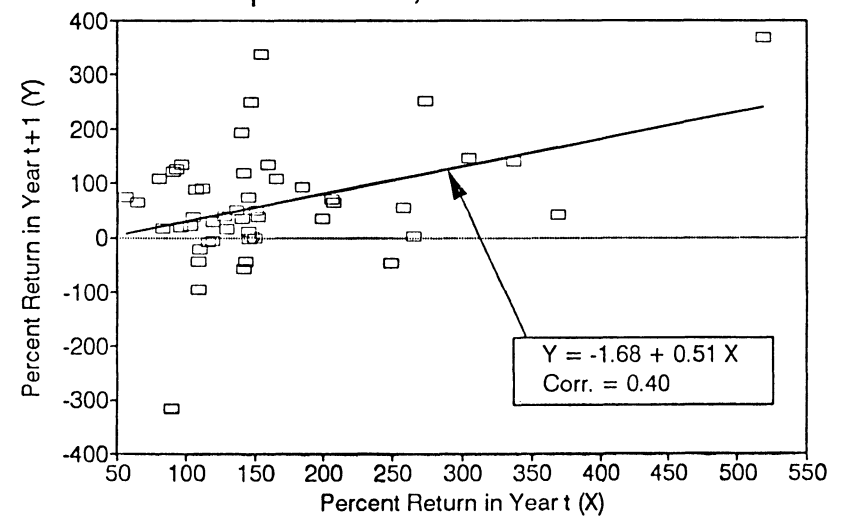


Fig.6: Predictability of CTA Std.
All CTAs, 1979-1989

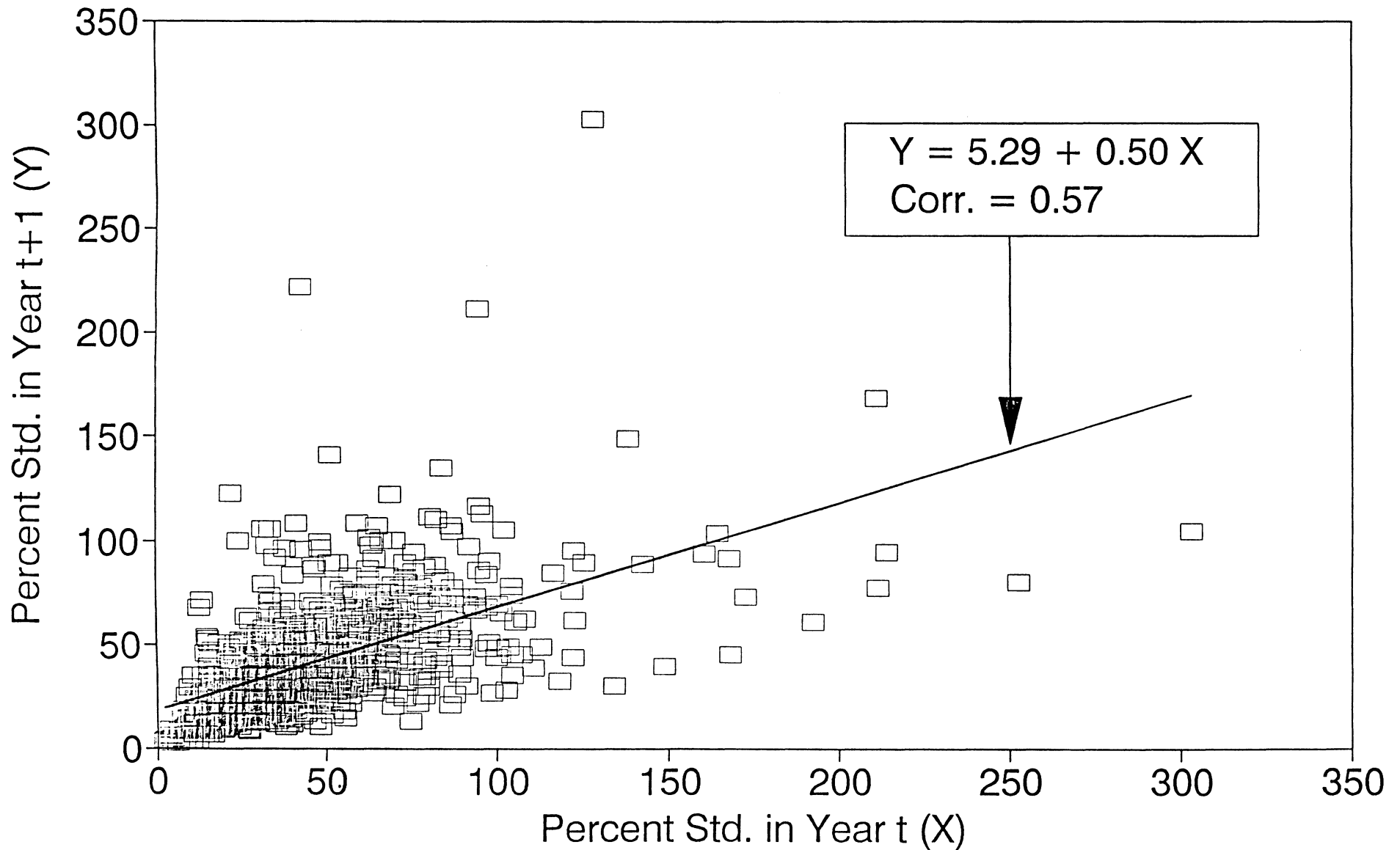


Fig.7: Predictability of CTA Std.
Top 1/3 CTAs, 1979-1989

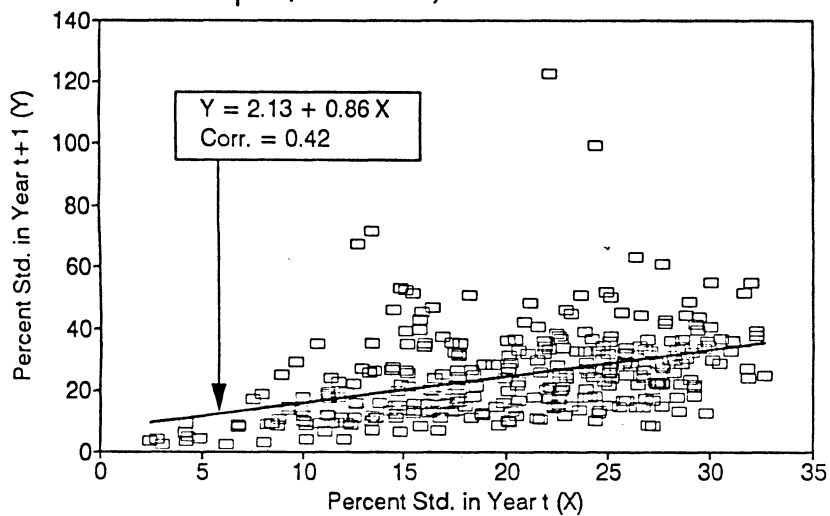


Fig.8: Predictability of CTA Std.
Middle 1/3 CTAs, 1979-1989

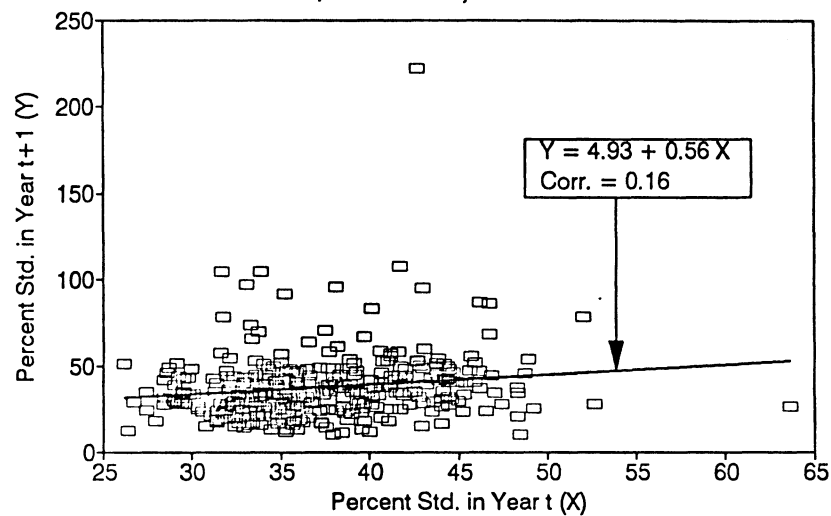


Fig.9: Predictability of CTA Std.
Bottom 1/3 CTAs, 1979-1989

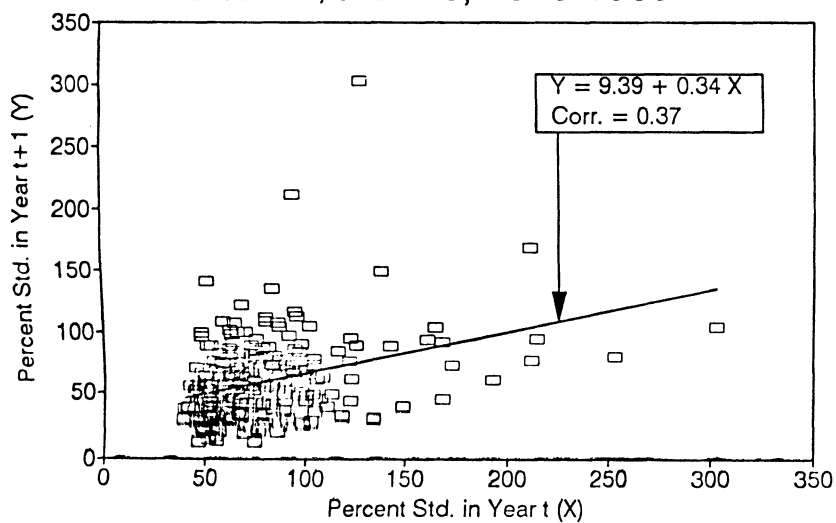


Fig.10: Predictability of CTA Std.
Top 5 CTAs, 1979-1989

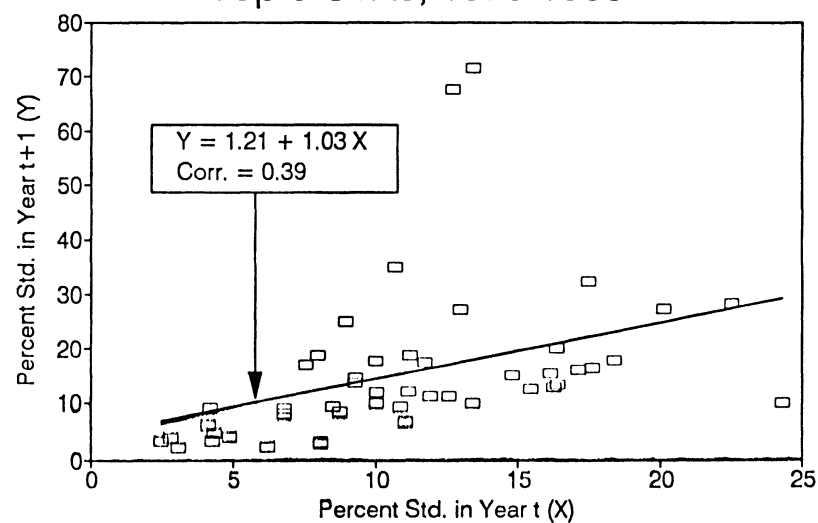


Fig.11: Predictability of Sharpe Ratio
All CTAs, 1979-1989

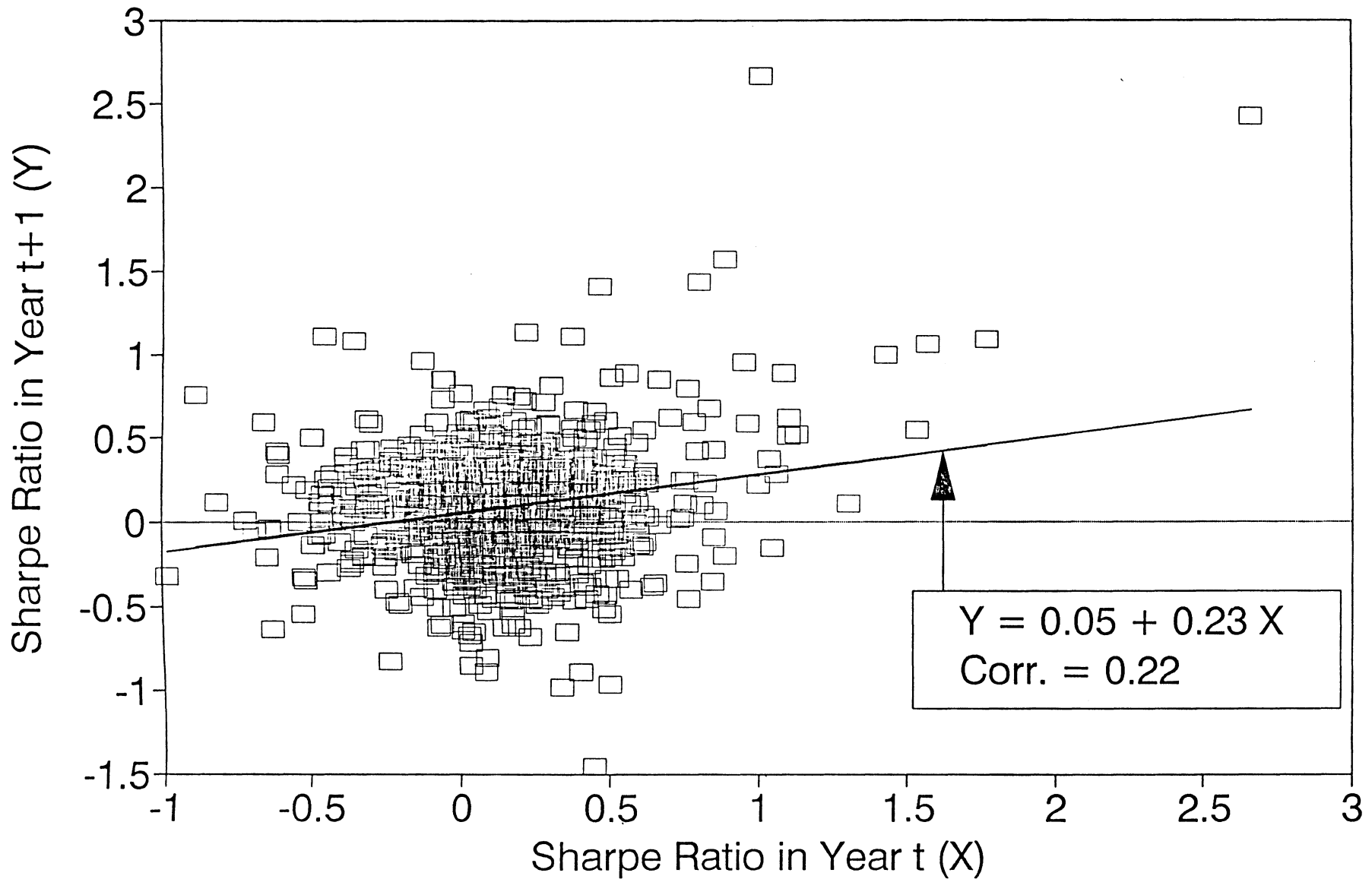


Fig.12: Predictability of Sharpe Ratio
Top 1/3 CTAs, 1979-1989

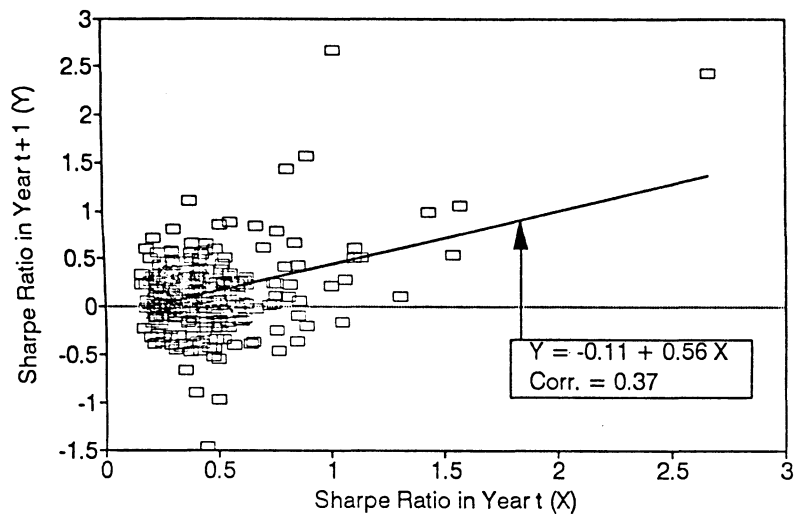


Fig.13: Predictability of Sharpe Ratio
Middle 1/3 CTAs, 1979-1989

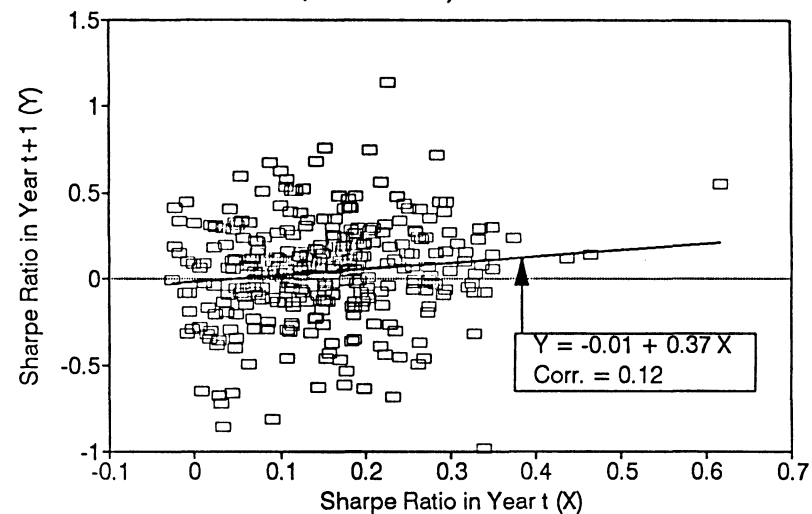


Fig.14: Predictability of Sharpe Ratio
Bottom 1/3 CTAs, 1979-1989

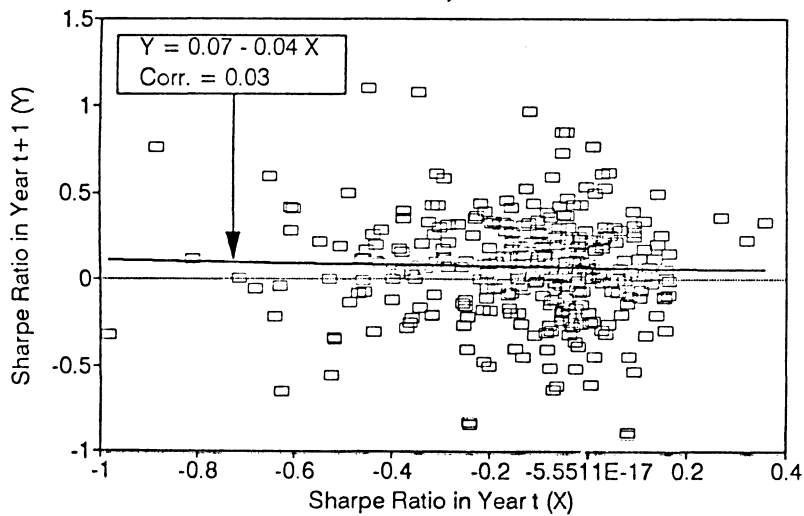


Fig.15: Predictability of Sharpe Ratio
Top 5 CTAs, 1979-1989

