EVALUATING US OPEN-END MUTUAL FUND PERFORMANCE

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ABSTRACT

This paper analyzes the performance of US open-end mutual funds by applying seven performance measures to monthly returns. The evaluation period is from January 1979 to December 2008. The results show that the Sharpe (1966) ratio has similar rankings to Jensen (1968) alpha. And the rankings of conditional and unconditional alphas are almost the same, implying that funds are well managed. However, the timing models indicate that although funds managers have strong stock-picking abilities, they cannot time the market. Moreover, the Fama-French (1996) three-factor model and Carhart (1997) four-factor model indicate more pessimistic results than the single factor models.

Keywords: Performance measures; Rankings of funds; Jensen alpha; Market-timing; Fama-French three-factor model; Carhart four-factor model

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1. INTRODUCTION

Over the past four decades, academics have been debating whether mutual funds can outperform the market. In order to measure the performance of fund managers, a number of different models have been proposed, such as Jensen (1968) alpha, Fama-French (1996) three-factor model. However, those performance measures may disagree with the rankings of mutual funds, and sometimes lead to totally different results. For example, Ferson and Schadt (1996) show that the unconditional alphas of mutual funds are mostly negative, indicating poor performance. But using a conditional model generates more positive alphas, so the performance of mutual funds becomes neutral.

In this paper, we include Sharpe (1966) ratio, unconditional and conditional Jensen alpha, unconditional and conditional Treynor and Mazuy market-timing models, Fama-French (1996) three-factor (FF) and Carhart (1997) four-factor models to examine whether mutual funds perform better than the market. We study the monthly data for nine categories of US open-end mutual funds over the 1979-2008 periods.

By comparing the results for different models, we highlight a number of points. First of all, the Sharpe ratio ranks the funds' performance to some extent the same as unconditional alpha does. The two measures indicate that medium funds are the biggest winners and medium blend funds have the best performance. In addition, the growth funds perform worst according to both models. Nevertheless, the Sharpe ratio ranks the large funds above the small funds. Yet unconditional alpha results in the opposite ranking. Second, there is no significant difference between unconditional alphas and conditional alphas. In both models, except for large growth, all the alphas are positive and only a medium blend style of funds has statistically significant alpha. Third, by applying Treynor and Mazuy (1966) market-timing measures, the absolute value of alphas becomes bigger and the number of significant alphas increases. However, there is only one positive timing coefficient. Furthermore, there is little difference between the conditional and unconditional models. Fourth, the results from the Fama-French three-factor model and Carhart four-factor model are quite different from those above. The ranks are completely changed, and there are fewer positive alphas. In the FF model we get four significant non-zero alphas, while in the Carhart model, only one significant alpha remains.

This paper is organized as follows. Part one is the introduction. Part two describes the models and the variables. Part three describes the data and data sources. Then we present empirical results and the interpretation of them in part four. Part five is the conclusion and remarks.

2. MODELS

2.1 Sharpe Ratio

Based on the Mean-Variance theory, Sharpe (1966) suggested a useful performance measure—the Sharpe ratio. The ratio takes into account not only the expected return of the portfolio, but also the volatility or standard deviation of the portfolio. The higher the ratio is, the higher your risk-adjusted return. The Sharpe ratio is defined as

$$Sh_p = \overline{R}_p / \hat{\sigma}_p, \quad (1)$$

where $\overline{R}_p$ is the portfolio p's average return in excess of the average risk-free rate, and $\hat{\sigma}_p$ is the estimated standard deviation of the returns of portfolio p.

2.2 Unconditional Jensen Alpha

As one of the most important traditional performance measures, Jensen alpha (1968) gives us the abnormal return of the specific portfolio by estimating the regression

$$R_{pt} = \alpha_p + \beta_p R_{mt} + u_{pt} \ , \tag{2}$$

where R_{pt} is the excess return of portfolio p over the risk-free rate, R_{mt} is the excess benchmark return, and α_p, the intercept of the regression, represents the superior or inferior managing ability of the portfolio manager. β_p is the slope—the sensitivity of the portfolio's excess return to market excess return. u_{pt} is the residual error of the regression.

2.3 Unconditional Market Timing

One weakness of Jensen alpha is that the measure can't separate the managers' stock-picking ability from their market-timing ability. In order to test whether or not the manager can time the market, Treynor and Mazuy (1966) created the market timing model, which is

$$R_{pt} = \alpha_p + \beta_p R_{mt} + \gamma_p R_{mt}^2 + u_{pt} \ , \tag{3}$$

where R_{pt} , R_{mt} , β_p and u_{pt} are the same as in the unconditional Jensen alpha model, α_p here measures only the stock-picking ability, and γ_p measures the market-timing ability. If the estimation of γ_p is positive, it means the manager has a superior prediction ability on market returns—the manager will hold more securities that are highly volatile when he or she thinks the market return will increase, and will hold less of those securities when the market return is expected to decrease. In other words, for a good manager, the portfolio's beta will be bigger when the market is going to rise and smaller when the market is going to fall.

2.4 Conditional Beta

Although Jensen alpha made a bold contribution in performance measurement, many scholars still object to it. Ferson and Schadt (1996) pointed out the unconditional Jensen alpha will be biased when the expected return and risk vary with the condition of the economy. In other words, the unconditional model can't capture the real performance when the portfolio is dynamically managed or traded. Thus, a negative alpha in that model possibly reflects that the portfolio raises its beta when the market return is less volatile. Another criticism is that the unconditional model takes all the information related to future return as superior information, which can give managers better performance. With the conditional model, Ferson and Schadt demonstrated such public information can only give the manager neutral performance.

In this paper we use the conditional beta suggested by Ferson and Schadt (1996):

$$\beta_p = b_{0p} + b_{1p} DY_{t-1} + b_{2p} TB_{t-1} \,, \qquad (4)$$

where DY is the lagged dividend yield of the market, and TB is the lagged one month T-bill rate or risk-free rate. Both DY and TB can be seen as predetermined instruments that capture the variation of beta over time. We can think them as the representative of readily available public information, so the bias on time-varying beta caused by public information can be reduced. Substituting for β_p from equation (4) into equation (2) yields the conditional model:

$$R_{pt} = \alpha_{cp} + b_{0p} R_{mt} + b_{1p} [DY_{t-1} R_{mt}] + b_{2p} [TB_{t-1} R_{mt}] + u_{pt} \,, \qquad (5)$$

where α_{cp} is the conditional alpha, b_{0p} is the unconditional beta, b_{1p} measures the variation of beta caused by dividend yield and b_{2p} measures the variation caused by risk-free rate.

2.5 Conditional Market Timing

Ferson and Schadt (1996) state that the unconditional market-timing model suggests any information correlated with future market returns is superior information. To distinguish "market timing" based on public information from market timing information that is superior to the lagged information variables, they propose the conditional market-timing model. Substituting for β_p from equation (4) into equation (3) yields the conditional model:

$$R_{pt} = \alpha_{cp} + b_{0p}R_{mt} + b_{1p}[DY_{t-1}R_{mt}] + b_{2p}[TB_{t-1}R_{mt}] + \gamma_{cp}R_{mt}^2 + u_{pt}, \qquad (6)$$

where α_{cp} measures the conditional stock-picking ability, and γ_{cp} is the estimator for conditional market-timing ability.

2.6 Fama-French Three-Factor Model

Since the intercepts in Jensen alpha are three to five times those of the Fama-French three-factor model, Fama and French (1996) discovered that the large abnormal returns in the Jensen alpha model can be captured by the three-factor model. They demonstrated that the portfolio's return not only relates to the excess return on the market portfolio, but also relates to two other factors: (a) the size of the firm, captured by SMB, and (b) the book-to-market ratio, captured by HML. SMB is the return on the small stocks' portfolio minus the return on the big stocks' portfolio, and HML is the return on the high book-to-market ratio stocks' portfolio minus the return on the low ratio stocks' portfolio. This model is defined as:

$$R_{pt} = \alpha_p + \beta_p R_{mt} + s_p(SMB) + h_p(HML) + u_{pt} \ , \qquad (7)$$

where SMB and HML are returns as mentioned above, R_{pt}, R_{mt} and β_p are as before, α_p is still the intercept of the regression but now takes the size and book-to-market effect into account, and s_p and h_p are the sensitivities of the portfolio p's return to the SMB and HML factor, respectively.

2.7 Carhart Four-Factor Model

The Fama and French model (1996) fails to explain the continuation of short-term returns as documented by Jegadeesh and Titman (1993). However, the Carhart (1997) four-factor model successfully solved this problem. Carhart thought the portfolio return should equal:

$$R_{pt} = \alpha_p + \beta_p R_{mt} + s_p(SMB) + h_p(HML) + m_p(MOM) + u_{pt} \ , \quad (8)$$

where the new factor MOM captures the one year momentum of the stocks' returns; it is the monthly average return of the two winner portfolios minus the monthly average return of the two loser portfolios.

3. DATA

We study monthly returns for 9223 US open-end mutual funds from January 1979 to December 2008. We collect all the returns of mutual funds from Morningstar, Inc. In order to avoid selection bias, we take all the accounts and portfolios in each given money management firm, so we may have several funds under the same firm.

Under the US open-end funds file, according to the underlying securities' capitalization size and their fundamental characteristics of value and growth, Morningstar categories all the mutual funds into 9 styles. For example, if most of securities in a fund belong to small cap and growth stocks, then the fund is classified as a small growth style fund. If a fund is not characterized by either value or growth style, it can be classified as a blend. As of June 25, 2009, we find 1429 funds under large value, 2111 under large blend, 1942 under large growth, 433 under medium value, 481 under medium blend, 917 under medium growth, 397 under small value, 682 under small blend, 831 under small growth. (See **Table1**)

Total portfolio returns are the equal-weighted individual fund's returns in that classification. To calculate the excess return of the equal-weighted portfolio, we subtract the risk-free rate from the portfolio's return (which is from Kenneth R. French-Data Library).

Since our sample contains only surviving funds, it may suffer from survivorship bias. Survivorship may give the surviving funds better performance than the funds as a group (Grinblatt and Titman 1998).Therefore, the survivorship bias may lead us to get a more optimistic result regarding to the overall performance of the mutual funds. However, because we use the same sample to construct the observations in each model, for comparison of the fund performance measurement models, our results are not likely to be affected significantly by survivorship biases.

Two commonly used traditional market indicators are used to measure the state of the stock market. Our lagged instruments are the lagged level of the one month Treasury bill yield from Kenneth R. French-Data Library and the lagged dividend yield from the CRSP value-weighted market index provided by Professor Robert R. Grauer.

The monthly returns of benchmark portfolio, the monthly values of SMB, HML in Fama-French model, and the monthly value for momentum factor in Carhart model are from Kenneth R. French Data Library.

4. EMPIRICAL RESULTS

4.1 Sharpe Ratio

Table 1 shows the results of Sharpe ratio for each style of funds from January 1979 to December 2008. Generally, growth funds have the lowest Sharpe ratios, which implies that they obtain the worst performance. Furthermore, small value funds dominate the small blend funds while large value funds dominate large blend funds as well. Thus we can conclude that in most cases, value funds have higher risk-adjusted returns than blend funds. Compared with large and small funds, medium funds are the biggest winners. Specifically, medium blend funds have the highest Sharpe ratio over nine styles of funds.

4.2 Unconditional and Conditional Jensen Alpha

Results for unconditional Jensen alpha are presented in **Table 2**. It is interesting to see that the performance ranked by alpha is very similar to that ranked by the Sharpe ratio. Again, the growth funds have the lowest estimated value of alpha, demonstrating the worst fund-management skill. It also shows the same result as in Sharpe ratio for funds under medium classification—they have the best performance. However, this is where the similarity between these two measure results ends. Unlike in Sharpe ratios where the small funds are lower than the large funds, in Jensen alpha the reverse holds true—the small funds' alphas are higher than the large funds' alphas.

In contrast to the results from Ferson and Schadt (1996) that indicate alphas from unconditional model are almost all negative, our unconditional alphas are almost all positive except for large growth funds. And at the confidence level of 95%, the alphas are statistically insignificant with only one exception for medium blends. Results for betas show that all the betas are significantly non-zero and only the betas of growth funds are bigger than 1, which means only growth funds are riskier than market portfolio. In addition, as the capitalization size becomes bigger, the risks become smaller. That is because small funds have the worst ability in diversifying risky securities while the large funds have the best diversification for risks.

Turning to the results for conditional alpha measure (see **Table 3**), three points stand out. First of all, we find that only for large value and medium value funds, R-square of conditional model increases by 0.01 compared with those of unconditional model. But for funds of other styles, the values of R-square are exactly the same. In other words, by adding two predetermined instruments to unconditional beta, we can barely raise the regression equation's explanatory power for the variability of mutual fund returns.

Second, in contrast to the findings of Ferson and Schadt (1996), our results show that 4 of 9 styles of funds obtain exactly the same alphas as unconditional ones, and another 4 styles of funds have slightly smaller alphas than unconditional ones—only small blend alpha is 0.01 bigger than that in unconditional model. Thus, we conclude that the covariance between the conditional beta and the market return formed using lagged instruments are slightly positive. Moreover, the ranking for alphas is still the same: Growth funds have the lowest alpha, and medium sized funds have the most superior performance. According to t-ratio, once again just medium blend fund's alpha is significant from 0. Therefore, in spite of variation of beta over time, both models show the similarly positive abnormal returns of mutual funds. It seems that the modification for the traditional model has little meaning in terms of alpha.

Third, as unconditional model, the coefficients on market excess returns are all significantly positive, and only those for growth funds are bigger than 1. Besides, the most interesting findings are: For the coefficients on dividend yield, only those positive ones are statistically significant, yet for the coefficients on T-bill rates, only those negative ones are statistically significant. We know that higher dividend yield sends a positive signal of expected market returns. In contrast, higher risk-free rate predicts lower market returns. So this coincides with the previous conclusion that our results indicate the conditional beta is positively correlated with future market returns.

4.3 Market Timing

Fund managers seem to have more attractive superior performance measured by unconditional market timing regression than by Jensen alpha. **Table 4** indicates that the absolute values of alphas, the measure for only stock-picking ability here, have become much greater. For instance, comparing with unconditional alphas, the intercept here for small blend funds is 4.4 times bigger, the intercept for small growth funds increased by 1.6 times, and increment for small values is 1.36 times. Besides, the number of significant alphas is raised, so that now we have two more styles of funds that their superior abnormal returns are significant from zero. However, the bad news is: Except for large growth funds, nearly all the other managers failed to time the market. The funds' perverse market-timing ability is presented by the negative estimate of timing coefficient. Among timing coefficients, five are significant including the positive one.

However, our interpretation here may be distorted according to Ferson and Warther (1996). Above all, there will be arbitrage opportunity for wise investors if they know that funds always get the wrong direction on moving of the market. All they need to do is to take the opposite position to funds and make profit. Another problem is that market-timing model can be unreliable if fund managers pick the stocks or use derivatives such as options and leverage.

Table 5 reports the results for conditional market-timing measure. In regards to alpha, 4 of 9 categories' funds obtain greater estimates compared to unconditional market-timing, but 2 of them get lower values, and the others are still the same as previous results. Even though there are some differences in estimated values, the fluctuations are very small—within the interval of 0.01~0.02. Coupled with the fact that negative and positive changes happen together, we can see the effect of model modification on alpha as neutral. This is also the case for timing coefficients. Remember Ferson and Schadt (1996) said that the market-timing ability is improved largely in conditional model, and most of the negative estimates in unconditional timing model changed to positive ones. In contrast, our results show that only for funds of medium value and small growth, the timing coefficients are raised by 0.001; yet for large value funds, the coefficient decreases 0.001. Nevertheless, the number of positive timing coefficient and the amount of significant estimates are still the same as unconditional market-timing model.

The estimates of R-square show that for small growth funds and large value funds, the fit of conditional timing model to the data is a little more ideal than the fit of unconditional timing model. But for other funds, the values of R-square are the same for unconditional and conditional measures. Once again, we found that there is no need to include factors of dividend yield and risk-free rate into the unconditional model.

4.4 Fama-French Three-Factor Model and Carhart Four-Factor Model

It is striking that we got much different results for Fama-French (FF) measure demonstrated by **Table 6**. Either Jensen’s model or market-timing show us that the growth funds have the worst performance, but FF tells us that growth funds are the winners if we take size effect and book-to-market ratio into account. Compared with unconditional Jensen alpha, the abnormal returns on growth funds are largely raised: Alphas for large growth, medium growth and small growth are increased by 1000%, 100% and 80%, respectively, while abnormal returns on other styles of funds are largely reduced so that 5 alphas become negative. Generally, the rank in terms of alpha for three sizes of funds is: Medium, large and small. Besides, instead of only one significant alpha in Jensen’s model, we get 4 significant alphas in FF.

In addition, the explanatory power of the regression is bigger than before, too. The Highest R-square is 0.99, indicating the nearly perfect fit of the regression to data. After adding two factors, betas’ changes become smoother than before, and the fluctuation of the estimates is much less. And, all the coefficients for both SMB and HML are statistically significant, indicating that size and book-to-market ratio do have effects on returns. Moreover, growth funds always have the highest coefficients of SMB, but the lowest coefficients of HML.

At the first glance of **Table 7**, we may think that fund managers' skills measured by Carhart model seem to be stronger than those measured by FF. It is true that we get more positive alphas now. However, the abnormal returns on value funds are reduced. In Carhart model growth funds are not always the winner anymore, because medium growth is beaten by medium blend funds. Besides, now only small blend funds' alpha is significant non-zero. These changes should result from the inclusion of the forth factor-MOM, which captures the momentum effect of stock returns. There are totally six significant coefficients for MOM so that we can believe it makes sense to add this estimator to FF model. We found that returns on value funds always have negative relationship with momentum factor, while returns on growth funds are positively influenced by MOM all the time. At last, the R-square is a little bit bigger for medium growth and medium value in Carhart model, indicating the more perfect fit of the Carhart model.

5. CONCLUSIONS

It is well-known that whether mutual funds can outperform the market is a controversial problem. Although people have applied many popular fund performance measures, the results generated by them are often inconsistent with each other. This paper focuses on the results of performance obtained by seven measures: The Sharpe ratio, unconditional and conditional Jensen alpha, conditional and unconditional Treynor and Mazuy market-timing, Fama-French three-factor model and Carhart four-factor model alphas. To illustrate the test, we use the monthly data for returns on 9223 mutual funds, lagged dividend yields and risk-free rates, as well as returns on the market, SMB, HML and MOM.

Here are our findings. First, the risk-adjusted returns measured by Sharpe ratio show results similar to unconditional alpha. Generally, the growth funds have the worst performance compared with value funds and blend funds, and medium funds have the best performance compared with large and small funds. Also, both models indicate the medium blend funds are the biggest winner. The only difference is that Sharpe ratios of large funds are greater than those of small funds, but the large funds' alphas are smaller than small funds'. The most important point is that our unconditional alphas are positive except for large growth funds, which differs from the findings of Ferson and Schadt (1966).

Second, unlike Ferson and Schadt (1966), we find little improvement of conditional alpha over unconditional alpha. Compared with the unconditional alpha model, 4 of 9 styles of funds obtain exactly the same alphas, yet the other 4 of 9 demonstrate worse performance. Moreover, there is only one negative alpha, and the ranks of fund performance are almost the same in both models. We also find that for both models, only medium blend funds' alpha is significant. Additionally, just three coefficients of dividend yield and risk-free rate, respectively, are statistically significant. So we conclude the lagged instruments fail to improve the model.

Third, all of the absolute values of alphas increase when measured by either unconditional or conditional market-timing regressions. Interestingly, the number of significant alphas rises. However, in contrast to the superior stock-picking abilities of fund managers, their market-timing abilities are perverse: there is only one positive timing-coefficient in both measures. In addition, compared conditional market-timing model with unconditional one, there are slight changes for values of timing coefficients, so there is no evidence of improvement for the market-timing ability in the conditional market-timing model.

Lastly, the results generated by Fama-French and Carhart measures are totally different from Jensen alpha and market-timing measures. Fama-French only seems to improve the performance for growth funds but worsens the other funds' performance. Hence, growth funds get the highest value of alpha, and the number of positive alphas becomes four. While in the Carhart model, the returns on value funds go up indicating the corresponding coefficients of MOM are negative; yet returns on growth funds go down indicating corresponding coefficients of MOM are positive.

APPENDICES

Table 1
Summary Statistics and Sharpe Ratios for Mutual Funds

The distributional moments of monthly returns and Sharpe ratios in our sample are estimated from January 1979 to December 2008. The skewness of the fund's distribution is a characterization of the degree of asymmetry of the distribution around its mean. Kurtosis is a measure of whether the data are peaked or flat relative to a normal distribution. The Sharpe ratio indicates the risk-adjusted return. It's defined as $Sh_p = \overline{R}_p / \hat{\sigma}_p,$ where $\overline{R}_p$ is the portfolio p's average return in excess of the average risk-free rate, $\hat{\sigma}_p$ is the estimated standard deviation of the returns of portfolio p.

Style	Mean	Standard Deviation	Skewness	Kurtosis	Sharpe Ratio
Large Blend	0.93	4.15	-0.88	2.99	0.111
Large Growth	0.98	4.87	-0.68	1.94	0.105
Large Value	0.93	3.80	-0.90	3.21	0.121
Medium Blend	1.15	4.68	-1.14	3.90	0.145
Medium Growth	1.11	5.49	-0.61	2.28	0.116
Medium Value	1.00	4.07	-1.15	4.53	0.129
Small Blend	1.02	5.02	-1.07	3.52	0.108
Small Growth	1.09	5.89	-0.57	2.09	0.105
Small Value	1.04	4.82	-0.98	3.49	0.118

Table 2
Unconditional Jensen Alpha

The unconditional Jensen (1968) performance measure is based on the regression $R_{pt} = \alpha_p + \beta_p R_{mt} + u_{pt}$, where R_{pt} is the excess return of portfolio p over the risk-free rate, R_{mt} is the benchmark return subtracted by the risk-free rate, α_p is known as Jensen alpha, the unconditional Jensen measure of performance, or Jensen's measure of selectivity. β_p is the slope, the sensitivity of the portfolio's excess return to market excess return. u_{pt} is the residual error of the regression.

	Unconditional Alpha		Unconditional Beta		
Fund Objective	**Estimate**	***t*-Ratio**	**Estimate**	***t*-Ratio**	**R-Square**
Large Blend	0.01	0.50	0.91	140.15	0.98
Large Growth	-0.01	-0.13	1.06	88.76	0.96
Large Value	0.07	1.06	0.79	54.53	0.89
Medium Blend	0.20	2.59	0.99	59.04	0.91
Medium Growth	0.08	0.77	1.14	50.61	0.88
Medium Value	0.12	1.38	0.82	42.21	0.83
Small Blend	0.05	0.45	1.00	38.93	0.81
Small Growth	0.05	0.33	1.17	37.95	0.80
Small Value	0.11	0.90	0.94	35.12	0.78

Table 3
Conditional Jensen Alpha

The conditional Jensen alpha model is $R_{pt} = \alpha_{cp} + b_{0p}R_{mt} + b_{1p}[DY_{t-1}R_{mt}] + b_{2p}[TB_{t-1}R_{mt}] + u_{pt}$, where DY is the lagged dividend yield of the market, and TB is the lagged one month T-bill rate or risk-free rate, α_{cp} is the conditional alpha, b_{0p} is the unconditional beta, b_{1p} measures the variation of beta caused by dividend yield and b_{2p} measures the variation caused by risk-free rate.

	Conditional Alpha		**Conditional Beta=$b_0 + b_1(DY) + b_2(TB)$**						
Fund Objective	**Estimate**	***t*-Ratio**	b_0	***t*-Ratio**	b_1	***t*-Ratio**	b_2	***t*-Ratio**	**R-Square**
Large Blend	0.01	0.42	0.92	67.47	0.17	3.04	-0.10	-3.55	0.98
Large Growth	-0.01	-0.13	1.07	41.99	-0.08	-0.78	0.01	0.26	0.96
Large Value	0.06	0.99	0.81	26.56	0.40	3.30	-0.23	-3.63	0.90
Medium Blend	0.19	2.55	1.00	28.14	0.22	1.55	-0.13	-1.86	0.91
Medium Growth	0.08	0.76	1.20	25.09	-0.27	-1.40	0.00	-0.02	0.88
Medium Value	0.11	1.29	0.95	23.32	0.20	1.25	-0.35	-4.21	0.84
Small Blend	0.06	0.49	0.86	15.77	0.54	2.48	0.04	0.38	0.81
Small Growth	0.04	0.29	1.31	20.12	-0.36	-1.37	-0.13	-0.94	0.80
Small Value	0.11	0.95	0.80	14.14	0.36	1.60	0.11	0.95	0.78

Table 4
Unconditional Market Timing

The unconditional market timing model is $R_{pt} = \alpha_p + \beta_p R_{mt} + \gamma_p R_{mt}^2 + u_{pt}$, where α_p measures only the stock-picking ability, and γ_p measures the market-timing ability. Positive γ_p indicates manager's superior timing ability, negative γ_p indicates manager's perverse timing ability.

	Unconditional Alpha		Unconditional Beta		Timing Coefficient		
Fund Objective	**Estimate**	***t*-Ratio**	**Estimate**	***t*-Ratio**	**Estimate**	***t*-Ratio**	**R-Square**
Large Blend	0.02	0.69	0.91	132.60	0.000	-0.52	0.98
Large Growth	-0.07	-1.08	1.06	85.18	0.003	2.03	0.96
Large Value	0.10	1.34	0.79	51.42	0.000	-0.86	0.89
Medium Blend	0.36	4.25	0.96	55.89	-0.007	-4.06	0.91
Medium Growth	0.09	0.82	1.14	47.84	-0.001	-0.29	0.88
Medium Value	0.23	2.30	0.81	39.54	-0.005	-2.28	0.84
Small Blend	0.27	2.05	0.97	36.38	-0.010	-3.49	0.82
Small Growth	0.13	0.80	1.16	35.66	-0.004	-1.07	0.80
Small Value	0.26	1.89	0.92	32.77	-0.007	-2.31	0.78

Table 5
Conditional Market Timing

The conditional market timing model is $R_{pt} = \alpha_{cp} + b_{0p}R_{mt} + b_{1p}[DY_{t-1}R_{mt}] + b_{2p}[TB_{t-1}R_{mt}] + \gamma_{cp}R_{mt}^2 + u_{pt}$, where α_{cp} measures the conditional stock-picking ability, and γ_{cp} is the estimator for conditional market-timing ability.

	Conditional Alpha		Conditional Beta=$b_0 + b_1(DY) + b_2(TB)$						Timing Coefficient		
Fund Objective	**Estimate**	***t*-Ratio**	b_0	***t*-Ratio**	b_1	***t*-Ratio**	b_2	***t*-Ratio**	**Estimate**	***t*-Ratio**	**R-Square**
Large Blend	0.02	0.53	0.92	65.79	0.16	3.04	-0.10	-3.52	0.000	-0.34	0.98
Large Growth	-0.07	-1.09	1.08	41.66	-0.08	-0.77	0.01	0.13	0.003	2.05	0.96
Large Value	0.09	1.20	0.81	25.80	0.40	3.29	-0.22	-3.58	-0.001	-0.70	0.90
Medium Blend	0.35	4.18	0.97	27.23	0.22	1.56	-0.12	-1.63	-0.007	-3.98	0.91
Medium Growth	0.09	0.77	1.20	24.44	-0.27	-1.40	0.00	-0.01	-0.001	-0.22	0.88
Medium Value	0.20	2.10	0.93	22.46	0.20	1.24	-0.34	-4.09	-0.004	-2.01	0.84
Small Blend	0.28	2.20	0.81	14.90	0.53	2.51	0.07	0.62	-0.010	-3.71	0.82
Small Growth	0.11	0.70	1.30	19.47	-0.36	-1.37	-0.12	-0.88	-0.003	-0.93	0.81
Small Value	0.28	2.04	0.77	13.40	0.36	1.60	0.13	1.11	-0.007	-2.50	0.78

Table 6
Fama-French Three-Factor Model

Fama and French (1996) discovered that the large abnormal returns in the Jensen alpha model can be captured by the three-factor model, $R_{pt} = \alpha_p + \beta_p R_{mt} + s_p(SMB) + h_p(HML) + u_{pt}$, where α_p is the intercept of the regression and it takes the size and book-to-market effect into account, SMB refers to the return on small stocks' portfolio minus the return on big stocks' portfolio, HML is the return on high book-to-market ratio stocks' portfolio minus return on low ratio stocks' portfolio. s_p and h_p are the sensitivities of the portfolio p's return to SMB and HML factor, respectively.

	Alpha		3 Factors						
Fund Objective	**Estimate**	***t*-Ratio**	**Beta**	***t*-Ratio**	**SMB**	***t*-Ratio**	**HML**	***t*-Ratio**	**R-Square**
Large Blend	-0.01	-0.46	0.94	154.49	-0.07	-8.29	0.06	6.55	0.99
Large Growth	0.09	2.12	0.98	92.73	0.06	3.83	-0.20	-12.18	0.97
Large Value	-0.09	-2.04	0.90	86.59	-0.08	-5.43	0.31	19.55	0.96
Medium Blend	0.08	1.45	0.99	72.45	0.33	17.93	0.17	8.01	0.95
Medium Growth	0.16	2.53	1.01	64.23	0.39	18.23	-0.22	-9.26	0.95
Medium Value	-0.07	-0.96	0.91	49.53	0.15	6.12	0.35	12.36	0.88
Small Blend	-0.14	-2.08	0.99	61.33	0.62	28.37	0.27	10.72	0.94
Small Growth	0.09	1.32	1.00	58.30	0.67	28.47	-0.20	-7.45	0.95
Small Value	-0.12	-1.26	0.97	43.09	0.49	15.81	0.36	10.24	0.87

Table 7
Carhart Four-Factor Model

Carhart (1997) four-factor model managed to explain the continuation of short-term returns documented by Jegadeesh and Titman (1993). The equation is $R_{pt} = \alpha_p + \beta_p R_{mt} + s_p(SMB) + h_p(HML) + m_p(MOM) + u_{pt}$, where the factor MOM captures the one year momentum of the stocks' returns and it is the monthly average return of the two winner portfolios minus the monthly average return of the two loser portfolios. m_p is the coefficient of MOM factor.

	Alpha		**4 Factors**								
Fund Objective	**Estimate**	***t*-Ratio**	**Beta**	***t*-Ratio**	**SMB**	***t*-Ratio**	**HML**	***t*-Ratio**	**MOM**	***t*-Ratio**	**R-Square**
Large Blend	0.00	0.09	0.94	153.48	-0.07	-8.20	0.06	6.09	-0.01	-2.27	0.99
Large Growth	0.04	0.96	0.99	95.42	0.05	3.69	-0.19	-11.52	0.05	4.91	0.97
Large Value	-0.01	-0.29	0.89	91.56	-0.07	-5.45	0.29	19.44	-0.07	-7.82	0.96
Medium Blend	0.10	1.70	0.98	71.60	0.33	17.98	0.16	7.67	-0.02	-1.23	0.95
Medium Growth	0.06	1.00	1.02	68.41	0.38	18.96	-0.20	-8.49	0.10	6.76	0.96
Medium Value	0.02	0.32	0.89	50.18	0.16	6.64	0.32	11.69	-0.09	-5.44	0.89
Small Blend	-0.16	-2.37	0.99	61.01	0.62	28.30	0.27	10.82	0.02	1.45	0.94
Small Growth	0.04	0.51	1.01	59.00	0.66	28.66	-0.18	-6.85	0.05	3.34	0.95
Small Value	-0.11	-1.11	0.97	42.54	0.49	15.79	0.35	9.99	-0.01	-0.46	0.87

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