Research on the Performance of China's Partial Equity Hybrid Public Fund

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Abstract: China's fund market has developed rapidly in recent years, and funds have been favored by investors due to their low investment threshold, wide variety, and professional management. Therefore, conducting a reasonable performance evaluation of funds is essential to help investors make better product choices. This paper uses monthly data from 2013 to 2023 to analyze and rank the performance of China's partial equity hybrid public fund. The results show that: (1) most of the funds are ranked close to each other when using the three single-factor indexes to rank their performance; (2) the Fama-French three-factor model and five-factor model have good applicability to the study of the performance of China's partial equity hybrid public Fund, and some of the factors have significant impacts on the fund's returns.

***Keywords*:** partial equity hybrid public fund, performance evaluation, asset pricing

1. Introduction

The development of the fund market has provided new investment choices for the majority of investors, enriched China's financial market, and greatly promoted the development of the market. China's fund market in recent years, although developed rapidly, but compared with other countries, there are still many shortcomings. For example, in terms of fund returns, the single-factor performance evaluation methodology to study fund performance has certain limitations, so it is important to have a comprehensive and reasonable fund performance evaluation system. This paper summarizes various types of fund performance evaluation methods, combines the Chinese market situation, and researches the performance of funds, hoping to help all parties involved in the market and the supervision of funds.

2. Fund performance evaluation methods

2.1 Capital Asset Pricing Model

In 1964, Sharpe proposed the Capital Asset Pricing Model (CAPM) based on modern portfolio theory, revealing the relationship between risk and asset return, providing new thinking about the performance evaluation of the asset portfolio.

$$R_p = R_f + \beta_p \left(R_M - R_f \right) \tag{1}$$

R_p and R_M represent the expected return on the portfolio and the market portfolio; R_f represents the risk-free rate. The return on the portfolio includes both the risk-free return and the compensation received for taking the risk.

2.2 Single-factor fund performance evaluation method

2.2.1 Treynor Ratio

The Treynor ratio, introduced by Treynor in 1965, incorporates risk adjustment into considering returns. It reflects the excess return that a portfolio earns per unit of systematic risk assumed, calculated as follows.

$$T_p = \frac{R_p - R_f}{\beta_p} \tag{2}$$

β represents systematic risk; R_p represents the expected rate of return of the portfolio; and R_f represents the risk-free interest rate.

2.2.2 Sharpe Ratio

Sharpe studied open-end securities investment funds in 1966 and proposed the Sharpe ratio. The ratio considers that the risk borne by a portfolio consists of both systematic and unsystematic risks, it balances systematic and unsystematic risks, reflecting the excess return of the portfolio in terms of the total unit of risk borne by the portfolio. The formula is as follows:

$$S_p = \frac{R_p - R_f}{\sigma_p} \tag{3}$$

σ_p represents the standard deviation of the portfolio, the total risk to which it is exposed. The larger the Sharpe index, the better the fund's performance is rated.

2.2.3 Jensen Alpha

The Jensen Alpha, introduced in 1968, divides the actual return on a portfolio into the excess return and return due to systematic risk-taking, calculated as follows:

$$\alpha_p = R_p - \left[R_f + \beta_p \left(R_M - R_f \right) \right] \tag{4}$$

α_p represents the Jensen Alpha; β represents the systematic risk faced by the portfolio; and R_M represents the average return of the market portfolio. If α_p is greater than 0, means that the fund has outperformed the market. Compared to the Treynor and Sharpe ratios, the Jensen Alpha not only ranks fund performance but also serves as an absolute indicator of whether a fund has outperformed the market.

2.3 Multi-factor model

2.3.1 Fama-French three-factor model

Fama and French proposed the three-factor model in 1993, which argues that in addition to the market risk factor, the size factor and the book-to-market ratio factor can also be used to explain asset returns as well. The specific formula of the model is given below:

$$R_{pt} - R_f = \alpha_p + \beta_p \left(R_{Mt} - R_{ft} \right) + s_p SMB_t + h_p HML_t + \varepsilon_p \tag{5}$$

R_{pt} denotes the return of fund p at moment t, R_f is the risk-free rate of return, $R_{Mt} - R_{ft}$ represents the market risk factor, SMB represents the size factor, HML represents the book-to-market ratio factor. The Fama French three-factor model also takes into account the influence of the size factor and book-to-market ratio factor on the fund's return based on considering the market risk factor. It has a stronger explanatory ability for the fund's return compared with the single-factor model, and is widely used in the evaluation of the fund's performance.

2.3.2 Fama-French five-factor model

The Fama French five-factor model is based on the three-factor model that takes into account the company's profitability and investment level, and the specific formula of the model is as follows:

$$R_{pt} - R_f = \alpha_p + \beta_p \left(R_{Mt} - R_{ft} \right) + s_p SMB_t + h_p HML_t + r_p RMW_t + c_p CMA_t + \varepsilon_p \tag{6}$$

RMW stands for the profitability factor, *CMA* stands for the investment factor, and the rest of the variables are explained in the same way as in the three-factor model. The Fama-French five-factor model is complementary to the three-factor model and can further explain the differences in the performance of the funds.

3. The empirical study on the performance of China's Partial Equity Hybrid Public Fund

3.1 Sample data source and selection

The fund data used in the empirical analysis of this paper come from the CSMAR economic and financial database and wind database. To ensure the reliability and stability of the sample data, this paper selects the monthly data from January 2013 to December 2023, and researches the performance of China's partial equity hybrid public fund during this period. Therefore, the sample funds should be launched earlier than January 2013. In addition, the sample funds should fulfill the following conditions: (1) The status of the fund is normal throughout the observation period, screening out the delisted funds. (2) The operation mode of the fund should be open-ended. (3) QDII-type, index-type, and categorized funds are excluded. After screening, a total of 45 funds are obtained, and this paper will take the performance of these 45 funds as the research object for empirical research.

3.2 Calculation of model variables

3.2.1 Fund return

In determining the fund's rate of return, taking into account the impact of the dividend split, this paper chooses to use the fund's monthly cumulative net share value growth rate R_t to represent the monthly data of the fund's rate of return. The specific calculation formula is as follows:

$$R_t = \frac{NV_t - NV_{t\text{-}1}}{NV_{t\text{-}1}} \tag{7}$$

R_t denotes the cumulative NAV growth rate of the fund in period t; NV t denotes the cumulative net worth of the fund in period t.

3.2.2 Risk-Free return

In determining the risk-free rate of return, this paper uses one-year time deposit rate to represent the risk-free rate of return R_f. From the annual rate of return R_{f_year} to calculate the monthly rate of return R_{f_m}. The formula is as follows:

$$\mathrm{R}_{f\_m} = \frac{\mathrm{R}_{f\_year}}{12} \tag{8}$$

3.2.3 Market portfolio return

The determination of the market portfolio benchmark return RM needs to take into account the fund's investment flows, considering that the object of this paper is partial equity hybrid fund, the paper assumed that the fund flows to stocks account for 80%, while bonds account for 20%, so the formula for the calculation of the market portfolio benchmark return can be written as follows:

$$R_M = 0.8 \times R_S + 0.2 \times R_B \tag{9}$$

R_S and R_B represent the monthly average returns of CSI 300 and CSI All Bond Index returns. In the selection of stock market returns, CSI 300 is chosen as a representative because in this index, the stocks are selected based on strict criteria, and at the same time, it has strong liquidity, coupled with better stability and a share allocation ratio similar to that of the market, which generally reflects the operation of the stock market. For the measure of bond market movements, the paper uses the monthly data of CSI All Bond Index returns.

3.3 Single-Factor fund performance evaluation results

Based on the previous section, this paper calculates the returns of the selected funds using the Sharpe Ratio, Treynor Ratio and Jensen alpha indices. Then, it ranks the average returns and the calculated risk-adjusted returns of the sample funds. Results are shown in Table 1.

Table 1. Performance of 45 sample funds

Fund Code	Average Monthly Return	Rank	Sharpe Ratio	Rank	Treynor Ratio	Rank	Jensen_α	Rank
000021	0.39%	37	3.20%	37	0.22%	39	0.07%	39
000061	0.62%	20	4.96%	28	0.34%	29	0.19%	26
040007	0.45%	32	4.79%	29	0.35%	28	0.14%	29
050009	0.61%	22	5.25%	26	0.39%	26	0.22%	25
070002	1.00%	10	13.09%	6	0.99%	7	0.65%	10
070003	0.41%	36	4.47%	31	0.25%	35	0.09%	36
070099	0.44%	33	4.32%	33	0.34%	30	0.14%	31
100026	0.55%	26	9.25%	19	0.64%	21	0.27%	22
100056	1.04%	8	10.93%	12	1.00%	6	0.68%	8
100060	1.08%	7	12.02%	10	0.89%	9	0.68%	7
110009	0.42%	35	5.01%	27	0.36%	27	0.14%	30
110013	0.62%	21	10.30%	15	0.77%	15	0.34%	21
110015	1.16%	4	13.50%	5	0.89%	10	0.74%	5
110025	0.48%	29	3.08%	39	0.24%	37	0.07%	40

Fund Code	Average Monthly Return	Rank	Sharpe Ratio	Rank	Treynor Ratio	Rank	Jensen_α	Rank
110029	0.61%	23	6.55%	24	0.49%	23	0.26%	23
180010	0.33%	41	3.18%	38	0.20%	40	0.07%	41
180031	1.31%	2	17.07%	1	1.32%	2	0.95%	1
202007	0.82%	16	8.41%	22	0.57%	22	0.40%	18
206009	1.02%	9	13.64%	4	1.11%	4	0.69%	6
260101	0.61%	24	10.84%	13	0.90%	8	0.35%	20
260104	0.81%	18	9.39%	18	0.66%	20	0.43%	17
260109	0.43%	34	5.79%	25	0.42%	25	0.17%	27
260110	0.97%	11	12.43%	9	0.77%	14	0.57%	12
288001	0.31%	42	2.36%	41	0.20%	41	0.08%	38
288002	0.60%	25	7.69%	23	0.46%	24	0.25%	24
320001	0.13%	45	-5.64%	45	-0.41%	45	-0.10%	45
320005	0.38%	38	3.76%	34	0.23%	38	0.08%	37
320007	0.46%	31	2.95%	40	0.27%	34	0.10%	34
340007	0.85%	15	8.97%	20	0.67%	19	0.46%	15
400015	0.95%	14	8.86%	21	0.78%	13	0.56%	13
470006	0.95%	13	9.91%	16	0.84%	11	0.58%	11
470009	1.30%	3	14.80%	3	1.16%	3	0.91%	3
481010	1.38%	1	13.04%	7	1.01%	5	0.93%	2
483003	0.37%	39	3.32%	36	0.25%	36	0.09%	35
519001	0.53%	27	4.45%	32	0.28%	32	0.11%	32
519005	0.19%	44	-2.08%	44	-0.23%	44	-0.04%	43
519018	0.49%	28	4.65%	30	0.33%	31	0.15%	28
519035	0.95%	12	11.49%	11	0.75%	16	0.55%	14
519068	0.82%	17	10.67%	14	0.72%	17	0.46%	16
519688	0.23%	43	-1.09%	43	-0.08%	43	0.02%	42
519694	0.73%	19	9.71%	17	0.67%	18	0.39%	19
570001	1.09%	6	12.94%	8	0.82%	12	0.67%	9
590002	0.36%	40	1.52%	42	0.10%	42	-0.07%	44
630002	1.11%	5	15.73%	2	1.32%	1	0.79%	4
660010	0.47%	30	3.41%	35	0.27%	33	0.10%	33

As can be seen from the results in the table, the monthly average returns of the 45 selected sample funds are all positive during the observation period, indicating that all of these funds can generate positive returns for investors. In addition, the three indices are very close to each other in terms of fund performance evaluation ranking. Although the Sharpe, Traynor and Jensen indices have different measurement methods and focus, the risk-adjusted results provide a better evaluation of the fund performance, both in terms of systematic risk and overall risk. In terms of the Jensen alpha results, only three funds are less than zero, suggesting that the vast majority of funds outperformed the market to have higher excess returns.

3.4 Multi-Factor model fund performance evaluation results

This paper uses the Fama French three-factor model and five-factor model to regress the selected funds, and the monthly returns of the sample funds as a whole are obtained from the weighted average of the returns of each fund according to the same weights. The results of the regression are shown in Table 2.

Column (1) shows the regression results of the Fama French three-factor model, the r2 of the regression equation is 0.918, which indicates that the model is well fitted. Specifically, the coefficient of the market risk premium factor RM-Rf is 0.589 and significant at the 1% level, indicating that the funds can obtain a certain amount of excess return while bearing the systematic risk of the market; the regression coefficient of the size factor SMB is -0.049, indicating that the fund as a whole tends to invest more in large-cap stocks, but since it did not pass the significance test, it indicates that the scale factor actually can not have big impact on the fund's return. The regression coefficient of HML is -0.534 and significant at 1% level, which indicates that the book-to-market factor and fund performance show a negative correlation, and the fund invests in stocks

with low book-to-market ratios to bring higher returns, which means the fund invests more in growth stocks.

Column (2) shows the regression results of the Fama French five-factor model. Specifically, the coefficient of the market risk factor RM -Rf is 0.608 and is significant at 1% level; the regression coefficient of the size factor SMB is 0.049, but it does not pass the significance test, which also indicates that in reality, the size factor does not have a significant impact on the fund's returns; the regression coefficient of the book-to-market ratio factor HML is -0.453 and is significant at 1% level. The coefficient of the profitability factor RMW is 0.133 and is significantly positive, indicating that the profitability factor also has a significant impact on the fund's excess returns. Funds are more inclined to invest in stocks with high profitability levels. The coefficient of CMA is -0.076, which indicates that the fund can get a greater return by investing in stocks with high investment rate, but because it does not pass the significance test, it indicates that in fact, the investment factor can not have significant impact on the fund's return.

Table 2. Regression results of the multi-factor model

	(1) FF 3 factors	(2) FF 5 factors
R_M -R_f	0.589***	0.608***
	(0.020)	(0.021)
SMB	-0.049	0.042
	(0.030)	(0.043)
HML	-0.534***	-0.453***
	(0.043)	(0.054)
RMW		0.133*
		(0.073)
CMA		-0.076
		(0.086)
α	0.003**	0.002**
	(0.001)	(0.001)
adj. R^2	0.918	0.923

Note: ***Significant at the 1% level,** Significant at the 5% level.,*Significant at the 10% level; the values in parentheses represent the robust Significant at the 5% level,** Significant at the 10% level; the values in parentheses represent the robust standard errors of the coefficients.

4. Conclusion

This paper selects China's partial equity hybrid public fund as the research object to study the performance of the sample funds between 2013 and 2023. Firstly, we compare and analyze the non-risk-adjusted returns of the sample funds with the three types of risk-adjusted returns to evaluate the performance of the funds, and then we choose the Fama-French multifactor model to further analyze the performance of the funds and their investment styles. The conclusions obtained are as follows: (1) In terms of single indexes, most fund's rankings are relatively close to each other based on Sharpe Ratio, Treynor Ratio and Jensen $\acute{a}$. (2) The Fama-French three-factor model and five-factor model have good applicability to the study of the performance of China's partial equity hybrid public fund, and some of the factors, such as the market risk factor, the book-to-market ratio factor, and the profitability factor, have a significant impact on fund returns.

References

[1] Sharpe W F. Capital asset prices: a theory of market equilibrium under conditions of risk[J]. The journal of finance, 1964, 19(3): 425-442.

[2] Fama, E F, French, K R. Common risk factors in the returns on stocks and bonds[J]. Journal of Financial Economics, 1993,(33): 33-56.

[3] Treynor, JL. How to rate management of investment funds[J]. Harvard Business Review, 1965, 43(1): 63-75.

[4] Heriksson RD, Merton RC. On market timing and investment performance I: An equilibrium theory of value for market forecasts [J]. Journal of Business,1981, 54(3): 363-406.

[5] Corso Kruk D, Coppe Pimentel R. Performance evaluation models applied to the Brazilian mutual funds market[J]. International Journal of Emerging Markets, 2024, 19(8): 2134-2151.

[6] Ajadi A D. An empirical evaluation of the performance of Nigerian pension fund managers[J]. African Journal of Economic and Management Studies, 2024.