

The Effects of Corporate Social Responsibility on Equity Fund Returns: Evidence from China

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Abstract

The purpose of this paper is to investigate whether the fund management companies in China have the corporate social responsibility (CSR) and its correlation with the fund performance. The samples are the equity funds between 2004 and 2012. The basis for assessment for the CSR is the Chinese fund company comprehensive assessment report, published by Morningstar Chinese Research Center in Jan 25th 2013. This research uses quantile regression model with three factors to measure the fund management companies with high ranking or low ranking average fund returns and provide investors some basis for investment decisions. The empirical results show the fund management companies with high ranking have better fund returns than those low ranking. Through quantile regression estimations, it is found that the market factors and fund returns have significant correlation with high ranking. The groups with low ranking and high fund returns, the funds performance has a significant positive correlation with the size factors. The group with high ranking and below medium fund returns, the fund performance has a positive relationship with the book to price ratio. Finally, in the fund management companies with extreme CSR ranking, the fund performance has a significant positive correlation with the fund net asset value.

Keywords: corporate social responsibility, equity funds, quantile regression model

1. Introduction

Chinese equity funds have developed rapidly, the market trading is very busy, and it has become the focus to the global investors. Started in 1998 with ten funds management companies, until 2012 the sizes are growing to 77 companies. Currently the situation is stable growing in numbers, highlighting that after the financial crisis, the equity funds have become an important investment channel for the investors. Given the relevant, the companies with the management and operations of the fund assets, the ability to run the fund assets and the management efficiency, are the key factors to affect the fund performance. Therefore, based on the variety of the fund management companies and the sizes of the funds, Morningstar Chinese Research Center in the 4th quarter of 2012, developed a Comprehensive assessment report for the Chinese fund management companies, giving comprehensive scores for the different companies ability to manage the funds, the business development capacity as well as the assets management capabilities, to categorized different companies comprehensive strengths. However, based on the differences, how investors make choices between the funds, the understanding of the strengths of the fund companies should be an important factor. In addition, in face of the fund management companies with different regulatory, it is another issue the investors should understand.

Corporate social responsibility (CSR) is an important indicator to measure firm performance and management capabilities; lately it has become a new measurement to assess the success of the firm, and being a factor for the investors to make investment decision. But SR has rarely being used as a basis to assess the company. Therefore, this paper is aiming to use CSR as a basis to observe the correlation it has with the fund performance, and as a reference to the investors' decision making. As noted, market investors usually have the ideas to separate the risk, and engage in regular and long term investments; it is compatible with the idea of the companies engage in CSR to have a sustainable development. In addition, the management of the mutual funds are not only by fund managers, but also by other managers, thus it is worthy to discuss whether the difference of managed quality of the fund management companies will affect the fund performance.

The previous researches mostly discussed how the combinations of the fund characteristics affect the fund performance, and rarely there is analysis of effect of characteristics of the fund management companies. Therefore, this paper will focus on the difference of managed quality on fund performance. In particular, because the existing literatures seldom study whether CSR affects fund performance, the lack of existing literatures will be investigated as the second purpose of this paper. To isolate the influence of other factors, this paper further considers the characteristics of stock market into our analysis and to examine how to affect the fund performance. Therefore, according to 2012 CSR report, the performance of equity funds of the Chinese fund management companies will be divided into two subsamples, namely good management quality or bad management quality, there may be a different relationship with the stock market. Finally, this paper will use the quantile regression model to observe the relationship between fund performance and key variables across quantiles. Consequently, using the Chinese market we will attempt to find whether CSR difference could be used as an indicator to assess the variations of fund performance, and whether it will be useful for investment decision making.

This paper proceeds as follows. Section II of this paper is the introduction of Chinese fund market as well as the key literatures. Section III of this paper states the definition of the variables and the setting up of the empirical model. Finally, Section IV states the data source and to summarizing the estimated results from quantile regression model. Section V is the conclusions and recommendations.

2. Literature review

The literature review will first introduce the development of the Chinese fund market, sorting out the past literatures which discuss the relevance between CSR and company performance, as well as discuss the fund size relevance with the fund performance, in order to find out the characteristics of the fund management companies and its influence on the fund performance, to be the theoretical basis to this paper empirical results.

2.1 The Introduction of the Chinese Mutual Fund Market

After 20 years of development, Chinese mutual fund market products have become diversified and more mature; not only the market is massive, but the numbers of the funds are innumerable. The sizes and the categories are all varied; it has become an important investment channel for the market investors. In China, the open-end funds have become the main stream in relative to the close-end funds. The open-end funds can accurately indicate the fund value, but the close-end fund cannot show the performance accurately. In addition, open-end funds have a much more impact to the market than the close-end funds. Its impact to the investment targets also is much bigger than the close-end funds. As shown in Table 1, the equity funds in Chinese fund market are much more than other types of funds. Therefore, this study will focus on the open-end stock fund as the study subject to further analyze how the characteristics of stock market affect the performance in different CSR evaluation.

Table 1. All kinds of Chinese mutual funds and the comparison of the sizes at the end of 2012

Types of Investment	Numbers	Total percentage of Numbers	Total asset values (¥)	Total Percentage of total asset values	Total share	Total share proportion
Equity Fund	397	28.56	7,854	29.24%	9,563	31.06
Mix Fund	227	16.33	5,938	22.10%	6,826	22.17
Currency Fund	87	6.26	5,262	19.59%	5,361	17.41
Bond Fund	395	28.42	3,398	12.65%	3,552	11.54
Index Fund	284	20.43	4,413	16.43%	5,490	17.83
Total	1,390	100.00	26,865	100.00%	30,792	100.00

Note. The unit is the one hundred million.

2.2 The Impact of Corporate Social Responsibility to the Performance

In recent years, the researchers who study how the CSR affect the firm performance commonly believed that the companies with high CSR usually have better financial performance and the stock returns. These studies such as Konar and Cohen (2001), Al-Tuwaijri, Christensen and Hughes (2004), Taso and Chen (2006), and Schuler and Cording (2006) believed there are significantly positive correlation. However, some researchers have opposite perspective. They argued that although biggest responsibility of the company is to maximize the shareholders wealth, therefore by misplacing the resources to the CSR, it will increase the financial cost. Thus it will bring the lower operating efficiency and lower profits. These studies like Becchetti, Ciciretti, and Hasan (2007) and Chang (2011) found empirical evidences that CSR hinders the corporation financial performance and lower the stock returns.

In addition, regarding the proxy variables for CSR, many studies used the CSR evaluation rankings to assess whether the companies have sufficient CSR. For example, McGuire et al. (1988), Cotrill (1990), and Preston and O'Bannon (1997) measured CSR through Fortune magazine; Waddock and Graves (1997) compared firm performances through IShare MSCI KLD 400 social index ETF (DSI) and S&P 500. Antunovich, Laster, and Mitnick(2000), Shefrin and Statman(2003), Anderson and Smith (2006), and Anginer, Fisher and Statman(2008) used Forbes magazine as the basis to rate CSR. In Taiwan, it includes the CSR lists announced by the Vision Magazine and the best corporate citizenship responsibility award given by World Magazine.

Based on the above observation, the past researchers have various views regarding how CSR affect firm performance. Currently as the China fund market has been booming, the fund management companies rank differently in the operating abilities. Thus this paper would like to investigate whether CSR affects fund performance like what the past studies did. The main reference will be the Morningstar Research Center evaluation report toward China Fund Companies, to be the key index of CSR, to explore under different ratings the differences among the fund management companies.

2.3 The Impact of the Fund Size Toward the Fund Performance

On the other hand, regarding how to fund size impacts the fund performance, Grinblatt and Titman(1989) and Gorman(1991) pointed out that when the fund size is too big, it will cause inflexibility to the operation and cost management. Therefore, they show there is a negative correlation between fund performance and fund size. However, Israelsen (1998) found that there is positive relationship between fund performance and fund size due to the economy of scale.

On the contrary, Grinblatt and Titman (1994) and Droms and Walker (1994) pointed out there is no significant relationship between fund performance and fund size. Similarly, Volkman, and Wohar (1995) separated the fund sizes to large, medium, and small categories. They found that in the large and small fund size groups there is a negative relationship between fund performance and fund size, but in the medium fund size groups, the fund size has a positive relationship with the fund performance. So it can say that in the large fund size groups, these are relatively slower to adapt to the market change and easily causing inefficiency, but in the medium fund size group there is sign of economic of scale.

To summarize the above observation, it could be said that there is no consensus whether fund size has significant relationship with the fund performance. Especially based on the different fund sizes, there could be many diverse results. Therefore, this study used the Chinese fund market as our empirical sample, to observe the correlation and further uses quantile regression model to examine the relationship between fund performance and the characteristics of stock market and to investigate whether there is significantly different results under particular quantile group.

3. Method

3.1 Operational Definition of Variables

3.1.1 Variables

For the measurement index for the fund performance, this study uses the monthly data gathered from the Taiwan Economic Journal (TEJ) database system to calculate fund returns. This paper use the $R_{i,t}$ as the symbol for the i fund portfolio returns and t to express the time.

3.1.2 Control Variables

Fama and French (1993) used monthly data of common stock price in NYSE from July 1963 to December 1991 to calculate the median of stock market value (market price multiplied by the outstanding stock), and distinguish to large and small investment portfolio. In addition, each portfolio is further to be 30% lowest net market value, 40% medium market value, and 30% higher market value. Therefore, it is combined into six investment portfolios, and built up market risk premium ($R_m - R_f$) size premium (*SMB*) and market net premium ratio (*HML*), total three factor model.

According to the method of Fama and French (1993), this study selects the fund size as the independent variable. The net asset value (NAV) is measured as fund size. In addition, this paper collects the stock closing price, outstanding shares, and book value of equity at year t-1 and year t. Among them, the market value of individual stock is calculated as stock closing price multiplied by outstanding shares, and book value of shareholder equity divided by market value. After categorized into big (*B*) and small (*S*) two groups, they are further categorized into the 30% low market value ratio (*L*), middle market value ratio (*M*) and 30% high market value ratio (*H*) three group, total six investment groups, as shown in Table 2.

Table 2. Fama and French three-factor model portfolio categories

	Low book-to-market ratio (<i>L</i>)	Middle book-to-market ratio (<i>M</i>)	High book-to-market ratio (<i>H</i>)
Big Size(<i>B</i>)	<i>B/L</i>	<i>B/M</i>	<i>B/H</i>
Small Size(<i>S</i>)	<i>S/L</i>	<i>S/M</i>	<i>S/H</i>

3.1.3 Quantile Regression Model

This study will adopt quantile regression model (QRM), to investigate the relationship between fund performance with high CSR and the characteristics of stock market, and whether there is significant difference with the non-appraisal fund management companies. Since QRM is calculated based on the empirical distribution of the sample, at the same time QRM does not give up any sample information, but is specially designed to estimate the “particular quantile marginal effect”, thus there is no data selection bias problem. Kuan (2008) had detailed description of the QR Mprocess with progressive characteristic; the QRM equation is shown as below:

$$y_t = x_t' \beta + \varepsilon_t \quad (1)$$

Y is interpreted variable, x is explanatory variable, β is estimate parameter, ε is residual, t is the numbers of company. If define θ as θ th conditional quantile, the lost parameter will be $V_T(\beta; \theta)$, as follow:

$$V_T(\beta; \theta) = \frac{1}{T} \left[\theta \sum_{t: y_t \geq x_t' \beta} |y_t - x_t' \beta| + (1 - \theta) \sum_{t: y_t < x_t' \beta} |y_t - x_t' \beta| \right] \quad (2)$$

T is the total number of the company. QR is to be calculated by using estimated parameter $\beta(\theta)$ to make $V_T(\beta; \theta)$ to be minimized, and then you can adjust the different quantile parameter θ and get the corresponding estimate parameters $\beta(\theta)$. This process can completely estimate different QRM based on complete sample, to observe the relationship between SR and FP, and have a more complete picture. When $\theta=0.5$, $\beta(0.5)$ is the result of least absolute deviation, LAD.

However, (2) is not a parameter to be differentiate everywhere, it does not have a closed form solution. Kuan (2008) suggested using linear programming algorithm to get the parameter estimate formula. For the $\beta(\theta)$ asymptotic matrix, this paper will adopt bootstrapping to estimate, to construct the assumption verification between QR and its confident interval. This study intends to adopt Matlab software programming model to resolve the model and estimate the total variable matrix.

4. Empirical Model

Based on Chinese public fund management companies, Morningstar Chinese Research Center in the 4th quarter of 2012 provides comprehensive assessment report as the measurement of corporate social responsibility indicators. It is putting the first 20 ranking fund management companies into the portfolio with high ranking and put those companies without any ranking into the portfolio with low ranking. It can be used to identify whether the fund management company has CSR and to examine our objectives. By using QRM to observe the distribution of the data, we will find out the relationship among Fama and French three factor model and fund size variable, the regression model is as follow:

$$R_{i,t} = constant + \beta(R_m - R_f)_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 SIZE_{i,t} + \varepsilon_{i,t} \quad (3)$$

where $R_{i,t}$ represents i fund portfolio returns at t month, including the groups with high CSR ranking and with low CSR ranking. $(R_m - R_f)$ is the market factor, which means the market portfolio excess return in t month, and it is calculated as the Shanghai A stock index monthly return minus three month interbank offered rate. The SMB_t is the size factor that also means size risk premium. HML_t is the book-to-market ratio factor, which is the portfolio returns with high monthly book-to-market ratio minus the portfolio returns with low monthly book-to-market ratio. The $SIZE_{i,t}$ is the fund size.

4. Data and Empirical Results

4.1 Data Resources and Summary Statistics

This paper adopts the all of Chinese public companies to measure the characteristics of stock market. The sample period is from January 2004 to December 2012. The sample length has 108 months. According to the Taiwan Economic Journal, the totals established before January 2004 and lasted to December 2012 are 68 fund management companies. Therefore, this paper uses these 68 fund companies as a whole sample to observe the equity fund returns and the relevance with different variables.

Comparing the two groups with high CSR ranking and low ranking, for the fund returns, the fund management companies high ranking is significantly performing better than the companies with low CSR ranking. On average, the mean values are 0.1907 and 0.1744, individually. In addition, the standard deviation for the companies with high CSR ranking, 1.5766, is smaller than the companies with low CSR ranking, 1.6474. In other words, the preliminary results state that the companies with high ranking have lower volatility of fund returns and it is smaller than the companies with low CSR ranking. By further analyzing the data distribution for the two groups, the difference of extreme value of companies with low CSR ranking have higher range, 10.7881, compared with the group with high CSR ranking, 10.0403, indicating the data distribution of fund returns is more dispersing. Among them, the group with high ranking fund average return, 0.1907, is smaller than the medium, 0.2543, indicating the data is distributing toward left. On the other hands, the average returns of the group with low CSR ranking, 0.1744, is larger than the medium, 0.1291, showing the data distribution presents the type of right skewness.

In other characteristics of fund management companies as NAV, management fees and custodial fee, the average value of the high CSR ranking group is 0.8235 which is larger than the low CSR ranking group, 0.6812. It implies that the fund management companies with high CSR ranking usually are larger size and may produce the efficiency of economies of scale. Finally, there is no difference for the management fee and custodian fee, but it is notice that the group with low CSR ranking usually has lower fund returns; however, they still charge the same management fee and custodian fee. Therefore, when the fund management company is evaluated as the high CSR ranking, the equity fund of these companies may be seen as a better investment choice.

Table 3. Summary statistics

Variables	Mean	Std.	Minimum	25%	Median	75%	Maximum
R	0.2420	1.5616	-5.9640	-0.4444	0.2234	1.0876	5.9052
$R_m - R_f$	-0.0309	0.0407	-0.1640	-0.0569	-0.0272	-0.0061	0.0726
SMB	0.0015	0.0189	-0.0407	-0.0115	0.0011	0.0106	0.0830
HML	-0.0048	0.0097	-0.0354	-0.0102	-0.0051	0.0017	0.0202
$SIZE$	0.7931	0.3570	0.2092	0.3808	0.8909	1.0766	1.4917
$MANA$	1.5003	0.0008	1.5000	1.5000	1.5000	1.5000	1.5027
$PROTECT$	0.2523	0.0045	0.2500	0.2500	0.2500	0.2500	0.2636
R_1	0.1907	1.5766	-6.5856	-0.5284	0.2543	1.2016	3.4547
$SIZE$	0.8235	0.4627	0.1761	0.2629	0.9902	1.1688	1.5654
$MANA$	1.5000	0.0000	1.5000	1.5000	1.5000	1.5000	1.5000
$PROTECT$	0.2500	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500
R_2	0.1744	1.6474	-6.8521	-0.4050	0.1291	1.1239	3.9360
$SIZE$	0.6812	0.3272	0.1382	0.3308	0.8068	0.9331	1.3030
$MANA$	1.5000	0.0000	1.5000	1.5000	1.5000	1.5000	1.5000
$PROTECT$	0.2500	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500

Note. The R represents fund portfolio returns. The R_1 represents the fund portfolio returns of the group with high CSR ranking and the R_2 represents the fund portfolio returns of the group with low CSR ranking. In addition, the $(R_m - R_f)$ represents the market risk premium, which is the Shanghai A stock index monthly return minus three month interbank offered rate, SMB is the scale factor, which is the small portfolio monthly return minus large portfolio monthly return; HML is the net market price factor, which is the portfolio returns with high monthly book-to-market ratio minus the portfolio returns with low monthly book-to-market ratio. Finally, the $SIZE$ and $MANA$ are the fund size and imanagement fee. The $PROTECT$ is the custodian fee.

4.2 Estimated Result of the Ordinary Least Square Regression

In Table 4, the traditional regression result shown that the mean of different sample groups are 0.6338, 0.5977,

0.5347 at least 5% significant level of 5%. All groups are showing significant positive results. From the two samples, the group with high CSR ranking is still higher than the group with low ranking. The result is matching the above description as well. From the estimated results of the Fama-French three factors, for the market factor, three samples coefficients individually are 14.3653, 14.9955, and 14.6846 at 1% significant level. They also display positive correlation with fund returns, showing market factor play an important role in fund performance.

From Table 4 observation of the scale factor, the estimated coefficients of the three samples are 17.0087, 14.5461, and 21.0224 at 5% significant level and present significantly positive relationship. Among them, the group with low CSR ranking has 21.0224, which is the highest. It is important to explain that in the high variation of stock returns and in the developing market, the fund returns for the company with low CSR ranking has better performance than the fund returns of those with high CSR ranking. The statements are consistent with the results of basic statistics, which the company with high CSR ranking is usually large fund size. In addition, through the observation of book-to-market ratio factor, all of estimated coefficients have significantly positive relationship at least 10% significant level, which are 28.4101, 47.3889, and 34.6911. We show that the companies with high CSR ranking present the highest coefficient and it implies that in the developed market, because the growth of stock price have significant difference, when the equity fund from the company with high CSR ranking is undervalued the market investors should invest. It will bring better fund performance.

Finally, the estimated results of fund size, we do not found that there is no significant correlation with fund returns. This actually differs from the previous studies' results. Therefore, considering the difference of both data distribution and trading ability of fund managers, this paper will further adopt the quantile regression model to observe the relationship between fund returns and these variables under different quantiles.

Table 4. Estimated results from the traditional regression model

Variables	Whole sample	The group with high CSR ranking	The group with low CSR ranking
	Coefficient (Std. error)	Coefficient (Std. error)	Coefficient (Std. error)
<i>Constant</i>	0.6338** (0.3152)	0.5977** (0.2491)	0.5347*** (0.3191)
$(R_m - R_f)_t$	14.3653*** (3.1268)	14.9955*** (3.3887)	14.6846*** (3.1417)
SMB_t	17.0087** (7.4122)	14.5461** (7.1449)	21.0224*** (8.1207)
HML_t	28.4101* (14.7518)	47.3889*** (14.5006)	34.6911*** (13.2257)
$SIZE_t$	0.2036 (0.3449)	0.3158 (0.2110)	0.3329 (0.3680)
Numbers of portfolio	68	20	48
Observations	108	108	108
R^2	0.2186	0.2939	0.2446

Note. Standard errors reported in brackets are Eicker-White standard errors, dependent variable is equity fund portfolio monthly return at t month, In addition, the $(R_m - R_f)$ represents the market risk premium, which is the Shanghai A stock index monthly return minus three month interbank offered rate, SMB is the scale factor, which is the small portfolio monthly return minus large portfolio monthly return; HML is the net market price factor, which is the portfolio returns with high monthly book-to-market ratio minus the portfolio returns with low monthly book-to-market ratio. Finally, the $SIZE$ and $MANA$ are the fund size and imanagement fee. The $PROTECT$ is the custodian fee. The asterisk, ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

4.3 Estimated Result of the Quantile Regression

By above, to capture the effect of each variables on different quantiles of fund returns, this paper uses quantile regression model to estimate the relationship among them. Table 5 shows the results of whole sample at five quantiles. Firstly, after dividing into different quantiles, the mean values are consistently showing negative correlation at 1% significant level. In the market risk premium factor, except for 95% quantile the estimated coefficient for each quantile presents positive influence on fund returns at 1% significant level; at 5% quantile is 0.2137, at 10% quantile is 0.1992, at 50% quantile is 0.1523, at 90% quantile is 0.1318. Our results indicate the market risk premium generally has obvious relationship with the fund returns. From the perspective of market

efficient, most funds do not reflect the market situation so that there is a positive correlation when the market risk increases. In addition, regarding the size factor estimated coefficient, this paper finds that when the degree of development of financial market increase, which can be defined that there is a significant difference in size factor, the group with high CSR ranking has better fund performance than the group with low CSR ranking. Except for the group with highest ranking, at the 5% significant level, the 50% quantile, 0.1914, and 90% quantile, 0.1618, show positive results; indicating the fund management companies with middle to high returns, fund performance has positive relationship with the size factor.

In addition, then observing the fund returns in relation to the book-to-market ratio factor, at 5% quantile, 0.5068, 10% quantile, 0.5795, and 50% quantile, 0.1786, at least 5% significant level there are positive correlation. It shows that when the degree of development of financial market is low, which present the inefficient of information transmission and the undervalued stock price, the low to middle returns of fund management companies will have high fund performance. The outcomes may be attributed to the irrational expectation. Meanwhile, in order to understand whether the results from whole sample are related to CSR or not, and the data divided into the CSR group and no CSR group, this study will conduct quantile regression estimation for the two groups.

Table 5. Estimated results from quantile regression for whole sample

Variables	5% quantile	10% quantile	50% quantile	90% quantile	95% quantile
	Coefficient (Std. error)				
<i>Constant</i>	-0.0424*** (0.0050)	-0.0383*** (0.0043)	-0.0270*** (0.0024)	-0.0201*** (0.0038)	-0.0144*** (0.0147)
$(R_m - R_f)_t$	0.2137*** (0.0312)	0.1992*** (0.0544)	0.1523*** (0.0361)	0.1318*** (0.0386)	0.1953 (0.0900)
<i>SMB_t</i>	0.1206 (0.1495)	0.1053 (0.2194)	0.1914** (0.0819)	0.1618** (0.0723)	0.0814 (0.1747)
<i>HML_t</i>	0.5068*** (0.1661)	0.5795*** (0.1400)	0.1786** (0.0890)	-0.0177 (0.0718)	0.0161 (0.0845)
<i>SIZE_t</i>	0.0065 (0.0071)	0.0042 (0.0053)	0.0045 (0.0029)	0.0078** (0.0035)	0.0071 (0.0150)
<i>Pseudo R²</i>	0.3270	0.3053	0.1973	0.2344	0.1732
Test of Slope Coefficient	5% quantile -95% quantile		10% quantile -90% quantile		
$H_0 : \beta_2 = \beta_2$	0.0300		0.1600		
$H_0 : \beta_3 = \beta_3$	10.4300***		8.8100***		
$H_0 : \beta_4 = \beta_4$	0.0000		0.2500		

Note. Standard errors reported in brackets are Eicker-White standard errors, dependent variable is equity fund portfolio monthly return at t month. In addition, the $(R_m - R_f)$ represents the market risk premium, which is the Shanghai A stock index monthly return minus three month interbank offered rate, *SMB* is the scale factor, which is the small portfolio monthly return minus large portfolio monthly return; *HML* is the net market price factor, which is the portfolio returns with high monthly book-to-market ratio minus the portfolio returns with low monthly book-to-market ratio. Finally, the *SIZE* and *MANA* are the fund size and imangement fee. The *PROTECT* is the custodian fee. The asterisk, ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

After typing for two groups, table 6 presents the estimated results from quantile regression. For the group with high CSR ranking, the estimated coefficients of market risk premium factor are 0.2179 at 5% quantile, 0.2459 at 10% quantile, 0.1296 at 50% quantile, 0.1670 at 90% quantile, and 0.1900 at 95% quantile. All present positive relationship with fund returns. By observing the estimated coefficient of book-to-market ratio factor, for 5% quantile is 0.5763, 10% quantile is 0.5910, 50% quantile is 0.3290, showing that at least 5% significant level. Combining the results of Table 4, the book-to-market ratio factor is found that there are no effects on the fund management companies with high CSR ranking and high performance, and the fund size has only affect the fund returns.

In view of this, the estimated results from whole sample have been affected by the coefficients of the CSR group. The comprehensive quantile regression results suggest that in the mature market, the investors should invest in the equity funds issued by the fund management companies with low to middle returns. The positive relationship

between fund returns and fund size also suggest that the investors can invest in the group with high CSR ranking and large fund size where the fund performance is in the 10% highest level or the 5% lowest.

Table 6. Estimated results from quantile regression for the group with high CSR ranking

Variables	5% quantile	10% quantile	50% quantile	90% quantile	95% quantile
	Coefficient (Std. error)				
<i>Constant</i>	-0.0477 ^{***} (0.0056)	-0.0369 ^{***} (0.0052)	-0.0264 ^{***} (0.0024)	-0.0175 ^{***} (0.0031)	-0.0145 ^{***} (0.0036)
$(R_m - R_f)_t$	0.2179 ^{***} (0.0668)	0.2459 ^{***} (0.0417)	0.1296 ^{**} (0.0501)	0.1670 ^{***} (0.0389)	0.1900 ^{***} (0.0562)
<i>SMB_t</i>	0.1492 (0.1389)	0.1198 (0.0785)	0.1527 [*] (0.0828)	0.0718 (0.1088)	0.0566 (0.1535)
<i>HML_t</i>	0.5763 ^{**} (0.2589)	0.5910 ^{***} (0.2220)	0.3290 ^{**} (0.1296)	0.0471 (0.0879)	0.0683 (0.1022)
<i>SIZE_t</i>	0.0105 ^{**} (0.0046)	0.0036 (0.0055)	0.0035 (0.0024)	0.0082 ^{***} (0.0025)	0.0070 ^{**} (0.0029)
Pseudo coefficient of determination	0.3192	0.3029	0.2278	0.2370	0.2395
Test of Slope Coefficient	5% quantile -95% quantile		10% quantile -90% quantile		
$H_0 : \beta_2 = \beta_2$	0.2500		0.2800		
$H_0 : \beta_3 = \beta_3$	4.2500 ^{**}		6.4800 ^{**}		
$H_0 : \beta_4 = \beta_4$	0.3600		0.5400		

Note. Standard errors reported in brackets are Eicker-White standard errors, dependent variable is equity fund portfolio monthly return at t month, In addition, the $(R_m - R_f)_t$ represents the market risk premium, which is the Shanghai A stock index monthly return minus three month interbank offered rate, *SMB* is the scale factor, which is the small portfolio monthly return minus large portfolio monthly return; *HML* is the net market price factor, which is the portfolio returns with high monthly book-to-market ratio minus the portfolio returns with low monthly book-to-market ratio. Finally, the *SIZE* and *MANA* are the fund size and imangement fee. The *PROTECT* is the custodian fee. The asterisk, ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

From Table 7 observation for the group with low CSR ranking, the estimated coefficient of market risk premium factor at 5% quantile is 0.3151, at 10% quantile is 0.2253, at 50% quantile is 0.1702, at 90% quantile is 0.1624, at 95% quantile is 0.2174. At least 5% significant level, there is positive correlation with fund returns, indicating the factor also has a significant relationship for the group with low CSR ranking. In addition, the estimated coefficient of size factor is also shown that the 50% quantile is 0.1492, the 90% quantile is 0.2453, and the 95% quantile is 0.2592, which means above 10% significant level, the mature market can increase the fund performance of the group with low CSR ranking. On the other hands, our results show that for the group with low CSR ranking, the fund management companies with middle to high fund returns has significant relationship between fund performance and size factor. This is matching the results of quantile regression results of whole sample. Thus it can explain that the results from whole sample are affected by the group with low CSR ranking. By comprehensive analyzing, in the mature market, when the returns vary greatly, the investors can invest in the fund management companies with low CSR ranking and high fund performance or in the fund management companies with high CSR ranking and low fund performance.

Table 7. Estimated results from quantile regression for the group with low CSR ranking

Variables	5% quantile	10% quantile	50% quantile	90% quantile	95% quantile
	Coefficient (Std. error)				
<i>Constant</i>	-0.0472** (0.0191)	-0.0390*** (0.0081)	-0.0245*** (0.0038)	-0.0166** (0.0068)	-0.0045 (0.0084)
$(R_m - R_f)_t$	0.3151** (0.1228)	0.2253*** (0.0406)	0.1702*** (0.0408)	0.1624*** (0.0543)	0.2174*** (0.0735)
<i>SMB_t</i>	0.1362 (0.1999)	0.0716 (0.1461)	0.1492* (0.0775)	0.2453** (0.1041)	0.2592*** (0.0884)
<i>HML_t</i>	0.1351 (0.5557)	0.3426 (0.2074)	0.2259** (0.1125)	0.0139 (0.1336)	-0.0542 (0.1472)
<i>SIZE_t</i>	0.0105 (0.0125)	0.0053 (0.0080)	0.0020 (0.0050)	0.0068 (0.0069)	-0.0030 (0.0084)
Pseudo coefficient of determination	0.3003	0.2797	0.1752	0.2401	0.2141
Test of Slope Coefficient	5% quantile -95% quantile		10% quantile -90% quantile		
$H_0: \beta_2 = \beta_5$	0.3100		1.0900		
$H_0: \beta_3 = \beta_6$	0.1000		2.2900		
$H_0: \beta_4 = \beta_7$	0.7000		0.0300		

Note. Standard errors reported in brackets are Eicker-White standard errors, dependent variable is equity fund portfolio monthly return at t month, In addition, the $(R_m - R_f)_t$ represents the market risk premium, which is the Shanghai A stock index monthly return minus three month interbank offered rate, *SMB* is the scale factor, which is the small portfolio monthly return minus large portfolio monthly return; *HML* is the net market price factor, which is the portfolio returns with high monthly book-to-market ratio minus the portfolio returns with low monthly book-to-market ratio. Finally, the *SIZE* and *MANA* are the fund size and imangement fee. The *PROTECT* is the custodian fee. The asterisk, ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

5. Conclusion

According to the empirical results, in term of basic statistic, the fund management companies with high CSR ranking average fund performance are better than the companies with low CSR ranking, and the risk indicators as standard deviation range of fund portfolio returns also present that the companies with high CSR ranking are small than that of the companies with low CSR ranking. Our results indicate that the group with high CSR ranking has less volatility in the fund returns, which support that using the annual report of Morningstar Chinese Research Center to decide the investment strategy can help to enhance the portfolio performance. Further analyze the data distribution of two groups of different CSR ranking, the range of fund portfolio returns of the group with low CSR ranking is larger than the group with high CSR ranking, which means the group with low ranking is more discrete and the fund returns varied more greatly. In addition, the group with high CSR ranking tends to be left skewness, the group with low CSR ranking presents right shrew. Regarding the fund size, the group with high CSR ranking tends to have bigger fund size. At last, there is no difference regarding fund management fee and fund custodian fee, thus it can be concluded that invest in the group with high CSR ranking should be a better choice.

According to the results of the traditional regression model, this paper found that the three factors proposed by Fama and French (1993) play an important role in Chinese equity fund market. In particular, the market risk premium factor is correlated with all the three samples (the whole sample, the group with high CSR ranking, the group with low CSR ranking). However, the results regarding the relationship between fund returns and fund size was not found a significantly relation, which is deviated from the previous literatures results.

On the other hands, from the estimated results of quantile regression model, it is notice that no matter for the whole sample group, the fund portfolio returns of group with high CSR ranking and the group with low CSR ranking were affected by market risk premium factor and presented a positive correlation. The outcomes also suggest that when the market is mature and the stock returns among the listed companies varied greatly. Market investors should select the group with high CSR ranking and with low fund performance to invest, or consider the equity funds issued by the group with low CSR ranking and with high fund performance into their asset

allocation. Finally, the estimated coefficients also indicate that the fund returns in the opposite two trails has positive correlation with the fund size in the group with high CSR ranking, therefore suggests the investor who invests in the group with high ranking should focus on the fund returns with return in the best 10% group and at the worst 5% group.

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