

## The Economics and Finance Letters

2016 Vol. 3, No. 1, pp. 1-7

ISSN(e): 2312-430X

ISSN(p): 2312-6310

DOI: 10.18488/journal.29/2016.3.1/29.1.1.7

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# THE INVESTMENT PERFORMANCE OF SOCIALLY RESPONSIBLE INVESTMENT IN JAPAN

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## ABSTRACT

*This paper examines the performance and risk sensitivities of Japanese ethical mutual funds vis-à-vis their conventional peers between 2005 and 2014, focusing upon the impact of the recent financial crisis. More specifically, in doing so, I investigate the aggregated performance and investment style of ethical and conventional mutual funds and allow for time variation in the funds' systematic risk. The empirical results are consistent with the evidence of asymmetric performance before-and-after the structural change, which is identified by Bai and Perrons' structural break test. The Japanese evidence supports the conjecture that any performance differential between ethical mutual funds and their conventional peers is statistically insignificant.*

**Keywords:** Financial crisis, Socially responsible investment, Structural break, Ethical mutual fund, CAPM, Carhart 4 factor model.

## I. INTRODUCTION

According to Global Sustainable Investment Review 2014, which is published by the Global Sustainable Investment Alliance), the global sustainable investment market has continued to grow both in absolute and relative terms, rising from \$13.3 trillion at the outset of 2012 to \$21.4 trillion at the start of 2014, and from 21.5 percent to 30.2 percent of the professionally managed assets in the regions covered. The largest sustainable investment strategy globally is negative screening/exclusions (\$14.4 trillion), followed by ESG integration (\$12.9 trillion) and corporate engagement/shareholder action (\$7.0 trillion).

Sustainable investment assets in Asia, although still comprising only a small share of total professionally managed assets in the region, now stand at \$53 billion, an increase of 32 percent from the \$40 billion tallied at the start of 2012. In Japan, growing interest in SRI is signaled by the fact that 192 financial institutions have signed the Principles for Financial Action for the 21st Century "to steer society toward sustainability by changing the flow of money to those activities which correspond to such sustainability goals." In addition, impact investing bonds and green real estate are gaining popularity in Japan. As a result, in the two years from September 30, 2011 to September 30, 2013, the net assets for all Japanese publicly offered investment trusts increased by

24.6%, and the number of trusts increased by 12.6%. However, at the same time, the net assets for SRI trusts have Dropped 7%, from ¥261.4 billion to ¥243.5 billion.<sup>1</sup>

This paper investigates the performance of a sample of socially responsible mutual funds from Japan investing globally and/or in the Japanese market<sup>2</sup>. The objective of this paper is twofold. First, with the intention of providing complementary evidence of SRI funds' performance. Japanese socially responsible funds attract little attention in the literature. The second purpose of this paper is to address the asymmetric financial performance before and after the financial crisis. Using unconditional and conditional models, I assess the performance of these funds in comparison to conventional and socially responsible benchmark portfolios. The conditional model, developed by [Ferson and Schadt \(1996\)](#) accounts for time variation of risk and is considered appropriate in current mutual fund performance literature. [Christopherson et al. \(1998\)](#) extended this conditional model to allow not only time varying risk measures, but also time varying estimates of performance depending on economic conditions.

This paper contributes in the existing literature on the relationship of fund returns and market returns by providing an analysis of the impact of financial analysis. Firstly, I show that a structural break took place during the crisis period, altering the fund returns to market returns. Secondly, I apply the extended conditional model which incorporates structural break into conditional model to measure the performance of Japanese socially responsible mutual funds. The few studies that apply conditional models to evaluate socially responsible fund performance are limited to the [Ferson and Schadt \(1996\)](#) specification of the model. I show that pattern observed for the response of mutual fund performance to market index, size, book-to-market, and stock price momentum under-perform during 'good times' and out-perform during 'good' times relative to relevant market proxy.

The term "socially responsible investment" refers to a set of approaches that investment decision that include social, ethical and environmental considerations in addition to conventional financial screening criteria. This strategy has led to a presumption that constraining the investment process will inhibit financial performance. Besides this, there are two other alternative hypotheses about the relative financial performance of socially responsible investment and conventional investment. The second argument is that the risk-adjusted expected returns of socially responsible portfolios are equal to the risk-adjusted expected returns of conventional portfolios. This line of argument implies that socially responsible investors do not reduce the relative cost of capital to socially responsible companies by favoring their stocks. The last argument is that the risk-adjusted expected returns of socially responsible portfolios are higher than the risk-adjusted expected returns of conventional portfolios. This is the case, "doing well while doing good". To determine which of the three assertion is consistent with evidence, a number of empirical studies which have investigated the investment returns of socially responsible mutual funds.

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<sup>1</sup>Japan information and asset data are collated from two sources, GSIA and Japan Sustainable Investment Forum (JSIF).

<sup>2</sup> In some countries, socially responsible fund is also called ethical fund.

Sjostrom (2011) summaries 21 academic studies of the financial performance of SRI funds, which are published between 2008 and 2011. Among them, seven studies find that SRI funds exhibit neutral performance relative to their conventional peers. Three studies report that SRI funds generate inferior performance relative to their conventional portfolios. Five studies conclude that SRI funds outperform conventional investment. Finally, six studies find mixed results—for example, the financial returns of SRI may vary with fund category or time period consideration.

The remainder of this paper is organized as follows. Next section presents the unconditional and conditional model of measuring the investment performance of socially responsible and conventional funds. Subsequent section describes the data and discusses the empirical results. “Concluding remarks” is provided at the last section.

## 2. EMPIRICAL MODEL

The performance evaluation of mutual funds in the previous studies can be illustrated by three major models: Sharpe (1964) Capital Asset Pricing Model (CAPM), Fama and French (1993) three-factor model and Carhart (1997) four-factor model. The intercept of CAPM is known as Jensen’s alpha, which is typically as a measure of out- or under- performance of mutual fund relative to market proxy. The unconditional CAPM is as follows:

$$R_{it} - R_{ft} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + e_{it} \quad (1)$$

where,  $R_{it}$  is the return of fund  $i$  in month  $t$ ,  $R_{mt}$  is the return on the market index in month  $t$ ,  $R_{ft}$  is the risk free rate in month  $t$ ,  $\beta_i$  is the slope coefficient of the regression and  $e_{it}$  is the error term. The single index model is not sufficient to explain the cross-sectional variation of stock returns. Fama and French (1993) propose a three-factor model to give a better explanation of fund performance. Besides market proxy, the model considers two additional factors, namely the returns on size- and book-to-market sorted equity portfolio. Fama and French (1993) three-factor model can be written as:

$$R_{it} - R_{ft} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + s_iSMB_t + h_iHML_t + e_{it} \quad (2)$$

where  $SMB_t$  is the difference in return between small cap portfolio and large cap portfolio at time  $t$ ,  $HML_t$  is the difference in return between a portfolio consist of ‘value’ stocks (with a high book-to-market ratio) and a portfolio containing ‘value’ stocks (with a low book-to-market ratio) at time  $t$ . Although three-factor model mitigate the average pricing errors of single-index model, it is still unable to capture the anomaly momentum. Carhart (1997) adds fourth factor to explain momentum-sorted portfolio returns into Fama and French three-factor model. It can be interpreted as performance attribution model, where the coefficients indicate the proportion average return attributable to four different kinds of investment strategies. Carhart (1997) four-factor model can be formalized as:

$$R_{it} - R_{ft} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + s_iSMB_t + h_iHML_t + m_iMOM_t + e_{it} \quad (3)$$

where  $MOM_t$  is the difference in return between a portfolio of past 12 months winners and a portfolio of past 12 months losers at time  $t$ . Ferson and Schadt (1996) believe that unconditional

performance model is unreliable because the expected returns and risks of mutual fund may vary over time. The conditional performance evaluation approach is attractive in fund performance for the reasons of dynamic behavior of returns and dynamic trading behavior of fund managers. Ferson and Schadt (1996) extend Jensen's alpha to incorporate conditioning information, which can be written as:

$$R_{it} - R_{ft} = \alpha_i + \beta_{vit}(R_{mt} - R_{ft}) + \beta_i Z_{it-1}(R_{mt} - R_{ft}) + s_i SMB_t + h_i HML_t + m_i MOM_t + e_{it} \quad (4)$$

where  $Z_{it-1}$  is the set of instruments for the information available at time  $t-1$ , including lagged level of 3 month treasury bill yield, lagged measure of the slope of the term structure (10 year government bond rate - 3 month treasury bil rate), a lagged quality spread in the corporate bond market, the lagged dividend yield. If a fund manager use public available information only, the Jensen's alpha will be zero, indicating neutral performance. Christopherson *et al.* (1998) further extending Ferson and Schadt (1996) model by allowing alpha to be time varying:

$$R_{it} - R_{ft} = \alpha_{i,0} + \alpha_{pi} Z_{it-1} + \beta_{vit}(R_{mt} - R_{ft}) + \beta_i Z_{it-1}(R_{mt} - R_{ft}) + s_i SMB_t + h_i SMB_t + m_i MOM_t + e_{it} \quad (5)$$

Alpha is the linear function of information variable. To allow for the possibility of structural change, equation (5) can be extended by interacting the financial crisis variables with alpha and market proxy, which intend to capture the impact of stock market movement asymmetrically both outside and during the financial crisis:

$$R_{it} - R_{ft} = [(\alpha_{i,0} + \alpha_{pi} Z_{it-1}) D_{x,t} + (\alpha_{i,0} + \alpha_{pi} Z_{it-1}) (1 - D_{x,t})] + \beta_{vit}(R_{mt} - R_{ft}) + \beta_i Z_{it-1}(R_{mt} - R_{ft}) + s_i SMB_t + h_i HML_t + m_i MOM_t + e_{it} \quad (6)$$

where  $D_{x,t}$  is the dummy variable, which equals to one as the onset of financial crisis and zero otherwise.

### 3. DATA AND EMPIRICAL RESULTS

This paper obtains monthly returns of socially responsible and conventional mutual funds from Thompson Reuters DataStream between December, 2005 and October, 2014 from Japan. The number of observation is 115. Information variables, such as 3 month Treasury bill rate, 10 year government bond rate and corporate bond rate, and dividend yield, also come from Thompson Reuters DataStream. The data on  $SMB_t$ ,  $HML_t$ ,  $MOM_t$ , and  $R_{mt} - R_{ft}$  are taken from Kenneth R. French website. There are 38 socially responsible mutual funds and 373 conventional mutual funds. The monthly returns are free from survivor bias.

Table 1 reports summary statistics pertaining to our sample of ethical and conventional funds. The market benchmark NIKKE 225 and TOPIX are included to make a comparison with SRI investment performance. These simple statistics suggest that ethical and conventional funds underperform relevant indices. The average risk-adjusted return of conventional funds is -10.93%, while the average risk-adjusted return of ethical funds is -10.83%. The difference in terms of risk and Sharpe ratio between ethical and conventional funds is less pronounced.

Table 2 presents the results of applying Eq. (1) and Eq. (3) on our sample. Regression results show that both ethical and conventional mutual funds underperform the value-weighted market proxy. For the CAPM based single-factor model, the observed alphas (-11.3% and -10.9%,

respectively) are statistically significant at 1% level. It has repeatedly argued that single-factor model is not sufficiently enough to explain the financial performance of cross section variation of mutual funds. Fama and French (1993) introduced a three-factor model that includes the factors *SMB* and *HML*, to explain excess market return. Carhart (1997) suggested the addition of momentum factor in order to capture the persistence in fund performance. The alphas presented in the four-factor model of Table 2 provide strong evidence of significant underperformance for ethical mutual funds (-10.5%) as well as for conventional mutual funds (-11.3%). The unconditional performance results point out that the ethical funds outperformed the conventional mutual funds in Japan.

It is well known that unconditional factor model may yield biased performance estimates if fund managers employ dynamic strategy, i.e. using public available information on the economy. To solve this problem, conditional model, proposed by Ferson and Schadt (1996) incorporates information variables into performance measures to account for the possibility of time variation in betas and expected returns. Furthermore, Christopherson *et al.* (1998) extend the conditional model of Ferson and Schadt (1996) to assume alpha a linear function of public available information.

**Table-1.** Summary statistics of ethical funds v.s. conventional funds

	Mean	Std	Sharpe ratio	No. of funds
conventional portfolio	-0.1093	0.1765	-0.6192	373
ethical portfolio	-0.1083	0.1755	-0.6174	38
NIKKEI 225	0.0022	0.0597	0.0363	
TOPIX	-0.0002	0.0552	-0.0039	

Ethical and conventional fund returns are calculated based on equally weighted portfolio of funds. Besides fund returns, I also provide summary statistics of relevant market-wide benchmark.

**Table-2.** Results of single-factor and four-factor model

	Single-factor	Adj R <sup>2</sup>	Four-factor	Adj R <sup>2</sup>
conventional portfolio	-0.113***	0.125	-0.113***	0.150
ethical portfolio	-0.109***	0.129	-0.105***	0.170

Table reports the estimated coefficients of Jensen's alpha for both Eq. (1) and Eq. (3). Eq. (1) is CAPM:  $R_t - R_{ft} = \alpha + \beta(R_{mt} - R_{ft}) + e_{it}$ , and eq.(3) is four-factor model:  $R_t - R_{ft} = \alpha + \beta_m(R_{mt} - R_{ft}) + \beta_{SMB}(R_{mt} - R_{ft}) + \beta_{HML}(R_{mt} - R_{ft}) + \beta_{MOM}(R_{mt} - R_{ft}) + e_{it}$ . All coefficients are Newey-West heteroscedasticity corrected. The superscript \*\*\* denotes that estimated coefficient is significant at 1% level.

Table 3 displays the result of conditional CAPM based single-factor and Carhart's four-factor model for Japan. The positive and significant alphas indicate that conditional performance measurement has provided more optimistic judgment of ethical and conventional mutual fund compared to the results of Table 2. Striking is that adjusted R<sup>2</sup> from the conditional model is higher (0.603 and 0.568) than adjusted R<sup>2</sup> from the conditional model (0.150 and 0.170). It is evident that performance measures considering public available information is better in explaining excess returns of mutual funds than performance measures without considering public available information. I also conduct Wald test to the incremental explanatory power to conditioning betas on a vector of the lagged economic variables. Wald test results show that the

time-invariant betas can be rejected at 1% level, confirming the importance of a framework that incorporates dynamic information into the factor exposure.<sup>3</sup> Table 4 contains the results governing the response of mutual fund returns to single-factor and four-factor in an effort to separate the impact outside and within the financial crisis. I formally test the structural change using tests for endogenously determined structural breaks. The Bai and Perron (1988) test is based upon an information criterion in the context of a sequential procedure, and allows one to find the number of breaks implied by the data, as well as estimating the timing of the breaks and the parameters of the processes between breaks. The result from Bai and Perron (1988) locate a significant break at January 2009. Hence, the crisis dummy variable equals to one after January 2009.

**Table-3.** Japanese mutual fund performance using both unconditional and conditional model.

	Single-factor	Adj R <sup>2</sup>	Four-factor	Adj R <sup>2</sup>
conventional portfolio	0.148***	0.613	0.145***	0.603
ethical portfolio	0.144***	0.574	0.144***	0.568

Table reports the estimated coefficients of Jensen’s alpha for both Eq. (5). CAPM based single factor model is  $R_t - R_{ft} = \alpha_{it} + \alpha_{ip} Z_{it} + \beta_p(R_{mt} - R_{ft}) + \beta_{z_{it}}(R_{mt} - R_{ft}) + e_{it}$ , and carhart four-factor model is  $R_t - R_{ft} = \alpha_{it} + \alpha_{ip} Z_{it} + \beta_p(R_{mt} - R_{ft}) + \beta_{z_{it}}(R_{mt} - R_{ft}) + sSMB_t + hHML_t + mMOM_t + e_{it}$ . All coefficients are Newey–West heteroscedasticity corrected.

The superscript \*\*\* denotes that estimated coefficient is significant at 1% level.

In line with the results reported in Table 3, they reveal that financial performance of mutual funds during crisis period dominates its non-crisis period counterpart. The positivity of Jensen’s alpha during ‘bad’ times reinforce that idea that within the financial crisis period, conventional and ethical mutual funds outperform relevant market proxies. On the other hand, the negativity of Jensen’s alpha during ‘good’ times indicates that conventional and ethical mutual funds underperform relevant market proxy. Given the evidence of dramatic change in sign of Jensen’s alpha, an important structural change occurs during the financial crisis. The adjusted  $R^2$  (ranging from 86.2% to 88.2%) for the conditional and unconditional model with structural change are very high. These values far exceed the adjusted  $R^2$  (ranging from 12.5% to 17%) in Table 2 and the adjusted  $R^2$  (ranging from 56.8% to 61.3%) in Table 3. These results provide strong support that conditional model considering structural change has a better explanatory power in performance measurement than unconditional model.

**Table-4.** Japanese mutual fund performance using both unconditional and conditional model with structural change

	Single-factor	Adj R <sup>2</sup>	Four-factor	Adj R <sup>2</sup>
Panel A.: non-crisis period				
conventional portfolio	-0.131***	0.881	-0.140***	0.882
ethical portfolio	-0.145***	0.866	-0.147***	0.863
Panel B: crisis period				
conventional portfolio	0.107***	0.881	0.104***	0.882
ethical portfolio	0.102***	0.866	0.103***	0.863

Table reports the estimated coefficients of Jensen’s alpha for both Eq. (5). Eq(6) is  $R_t - R_{ft} = [(\alpha_{it} + \alpha_{ip} Z_{it})D_{it} + (\alpha_{it} + \alpha_{ip} Z_{it})(1 - D_{it})] + \beta_p(R_{mt} - R_{ft}) + \beta_{z_{it}}(R_{mt} - R_{ft}) + sSMB_t + hHML_t + mMOM_t + e_{it}$ . All coefficients are Newey–West heteroscedasticity corrected.

The superscript \*\*\* denotes that estimated coefficient is significant at 1% level.

<sup>3</sup>The p-value are less than 1 %.

#### 4. CONCLUSION

The subprime crisis provides new evidence of investment performance of ethical mutual funds. I use data for Japanese mutual funds to examine whether risk adjusted excess return of SRI outperformed or under performed market index as the crisis developed. Motivated by the frequently adopted definition of structural change in the literature, I use Bai and Perron (1988) structural break test to identify the crisis period and estimate the performance of socially responsible funds for Japan.

The empirical results are fourfold. First, using unconditional CAPM based single-factor and Carhart four-factor model, both conventional and ethical mutual funds underperform the relevant market-wide index. Second, the results provide strong evidence of time variation in alphas, betas, and expected. The significance of information variables in explaining performance measures, support the notion of dynamic trading strategy employed by fund managers. Third, I investigate the relative returns of ethical versus conventional funds before and after the financial crisis. This provides the idea that ethical and conventional funds underperform the market-wide index outside the financial crisis period. In striking contrast, they outperform the relevant market proxy as the crisis developed. Fourth, the difference in return in ethical and conventional funds is found insignificant in this paper. This finding is consistent with the previous studies. The evidence of neutral performance of ethical funds relative their conventional peers indicates that Japanese investors are able to allocate their money in Sri without incurring of any loss.

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