International Review of Economics and Finance 29 (2014) 30–46

Contents lists available at ScienceDirect

International Review of Economics and Finance

journal homepage: www.elsevier.com/locate/iref

Benchmark models of expected returns in U.K. portfolio performance: An empirical investigation

Jonathan Fletcher *

University of Strathclyde, Department of Accounting and Finance, Curran Building, 100 Cathedral Street, Glasgow, G4 0LN, United Kingdom

ARTICLE INFO

Article history:
Received 12 June 2012
Received in revised form 22 March 2013
Accepted 8 April 2013
Available online 28 April 2013

JEL classification:
G11
G12

Keywords:
No arbitrage
Index-based models
Benchmark models of expected returns

ABSTRACT

I use the second Hansen and Jagannathan (1997) distance measure (HJD) to examine whether index-based models similar to Cremers, Petajisto, and Zitzewitz (forthcoming) are more reliable benchmark models of expected returns than the Fama and French (1993) and Carhart (1997) models in U.K. stock returns. I use the second HJD as it is important to take account of pricing errors over possible contingent claims when considering benchmark models that are used in fund performance applications (Wang & Zhang, 2012). I find that all of the candidate benchmark models are misspecified. I find that conditional multifactor models provide significant lower second HJD compared to the unconditional factor models. I find that there is nothing to be gained in terms of significant lower second HJD in using the index-based models compared to the conditional Carhart model. My results suggest that among the models I consider, the most reliable models are the conditional Carhart model and the conditional seven-index model of Cremers et al. (forthcoming).

1. Introduction

The linear factor models of Fama and French (1993) and Carhart (1997) are used extensively in the evaluation of managed fund performance and for examining the performance of trading strategies (e.g. Alwathainani, 2012). Fama and French (2010) provide comprehensive evidence on U.S. mutual fund performance using these two models as do Cuthbertson, Nitzsche, and O'Sullivan (2008) for U.K. unit trusts.[1,2] Recent studies by Chan, Dimmock, and Lakonishok (2009) and Cremers et al. (forthcoming) highlight problems in using both the Fama and French and Carhart models in fund performance. Cremers et al. find that different passive indexes have significant performance relative to both models which suggests that the models are unable to correctly assign zero performance to passive trading strategies with no skill.

Cremers et al. (forthcoming) propose alternative index-based models to evaluate fund performance. The index-based models are constructed from benchmark indexes provided by Standard and Poor's and Frank Russell and provide alternative ways to capture the size and value/growth effects in stock returns. Cremers et al. find that their index-based models outperform the Fama and French (1993) and Carhart (1997) models in a number of specification tests.

I examine, using U.K. stock return data, whether index-based models similar to Cremers et al. (forthcoming) provide more reliable benchmark models of expected returns compared to the Fama and French (1993) and Carhart (1997) models. My study

* Tel.: +44 141 548 4963; fax: +44 552 3547.
E-mail address: j.fletcher@strath.ac.uk.

[1] U.K. unit trusts are equivalent to open-end U.S. mutual funds.

[2] Cuthbertson, Notzsche, and O'Sullivan (2010) provide an excellent review of open-end U.S. and U.K. fund performance evidence.

1059-0560/$ – see front matter
http://dx.doi.org/10.1016/j.iref.2013.04.001

differs from Cremers et al. in that I evaluate the models using the second Hansen and Jagannathan (1997) distance measure (HJD). Hansen and Jagannathan show that the second HJD captures the minimum distance between a candidate stochastic discount factor[3] model and the set of nonnegative stochastic discount factors that correctly price a given set of test assets.[4] The second HJD penalizes models that have pricing errors in the test assets and pricing errors in potential contingent claims, such as derivative claims in the test assets.

Wang and Zhang (2012) argue that it is important to use the second HJD to evaluate benchmark models that can be used in fund performance because the payoffs of managed funds can approximate contingent claims (see Dybvig & Ross, 1985; Glosten and Jagannathan, 1994; Merton, 1981 among others). The payoffs of a managed fund can approximate contingent claims either by the fund investing directly in derivatives or by engaging in dynamic trading strategies (e.g. Merton). This latter case is important as many traditional U.K. open-end and closed-end funds do not invest directly in derivatives. Benchmark models that cannot price correctly contingent claims are unreliable for evaluating fund performance (see Chen & Knez, 1996; Glosten & Jagannathan, 1994; Wang & Zhang, 2012 among others for more discussion).

I consider both unconditional and conditional versions of the two index-based models similar to Cremers et al. (forthcoming) and the two empirical factor models similar to Fama and French (1993) and Carhart (1997). I also include the capital asset pricing model (CAPM) as an additional benchmark model. I estimate and evaluate the models using the second HJD between January 1959 and December 2010 using the approach developed by the recent studies of Li, Xu, and Zhang (2010) and Gospodinov, Kan, and Robotti (2010). I compare the performance of the models by testing the equality of the squared second HJD measures between models using the pairwise and multiple model comparison tests developed by Gospodinov et al. (2010) and Gospodinov, Kan, and Robotti (2013).

There are three main findings in my paper. First, I find that all of the candidate benchmark models are misspecified. None of the models are able to correctly price the N payoffs and be arbitrage free at the same time. Second, I find that the conditional multifactor models provide significant lower second HJD relative to the unconditional factor models and the conditional CAPM using the excess returns and scaled excess returns of size/dividend yield (DY) portfolios and gross Treasury Bill return as the set of payoffs. Third, I find that there is nothing to be gained in using the index-based models compared to the conditional Carhart (1997) model as there are no significant differences in the second HJD between the conditional Carhart and seven-index models. The results of the paper would suggest that among the factor models I consider, the conditional Carhart model or conditional seven-index model is the most reliable models to use in evaluating U.K. fund performance.

My study contributes to the large literature which focuses on the admissibility of benchmark models in evaluating U.S. and U.K. managed fund performance. A partial list includes Fletcher (1994), Ahn, Cao, and Chretien (2009), Chan et al. (2009), and Cremers et al. (forthcoming) among others. I contribute to this literature by using the second HJD to evaluate the benchmark models. Related papers by Wang and Zhang (2012), Chen and Ludvigson (2009), Li et al. (2010), and Gospodinov et al. (2010, 2013) in U.S. stock returns and Fletcher (2010) in U.K. stock returns use the second HJD to evaluate different asset pricing models. My study differs from these studies, in particular Fletcher, by comparing the index-based models of Cremers et al. relative to the Fama and French (1993) and Carhart (1997) models.

The paper is organized as follows. Section 2 describes the research method used in the study. Section 3 reports the data. Section 4 presents the empirical results. The final section concludes.

2. Research method

Ross (1978), Harrison and Kreps (1979), and Hansen and Richard (1987), among others, show that if the law of one price (LOP) holds in financial markets then there exists a stochastic discount factor m_t such that:

$$E_{t-1}(m_t x_t) = q_{t-1}. \tag{1}$$

where x_t is a (P,1) vector of the payoffs of P primitive assets at time t, and q_{t-1} is a (P,1) vector of the costs of the P primitive assets at time $t-1$. Where financial markets satisfy the no arbitrage (NA) restriction, m_t will be positive in every state of nature (Cochrane, 2005). The stochastic discount factor will only be unique if markets are complete.[5] Eq. (1) states that conditional on the information available at time $t-1$, the risk-adjusted payoffs of the primitive assets at time t have costs equal to q_{t-1}. In my study, the payoffs are the gross returns of the U.K. Treasury Bill and the excess returns of test portfolios sorted by security characteristics. In this case, the q_{t-1} vector is given by $[1;0_{P-1}]$, where 0_{P-1} is a $(P-1,1)$ vector of zeros.

Taking unconditional expectations of Eq. (1) results in the unconditional pricing equation:

$$E(m_t x_t) = E(q_{t-1}). \tag{2}$$

The difference between the left-hand side and right-hand side of Eq. (2) are the pricing errors of the primitive assets. Cochrane (1996, 2005) shows that the unconditional pricing equation in Eq. (2) can be used to incorporate the impact of conditioning information without having to specify a model of conditional moments.[6] Define Z_{t-1} as a $(L+1,1)$ vector of a constant and L

[3] See Ferson (2003) and Cochrane (2005) for excellent reviews of the stochastic discount factor approach to asset pricing. Ferson (forthcoming) shows how the stochastic discount factor approach can be used to unify a number of important issues in fund performance.

[4] The set of nonnegative stochastic discount factors that correctly price the set of test assets are known as admissible stochastic discount factors. Models which do not belong to this set are known as inadmissible models.

[5] Markets are complete when investors can buy any contingent claim (see Cochrane, 2005).

[6] Asset pricing models can be evaluated using conditional moments in Eq. (1) as in Nagel and Singleton (2011).