Finance Research Letters 13 (2015) 97–104

Contents lists available at ScienceDirect

Finance Research Letters

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

Testing equality of modified Sharpe ratios ☆

David Ardia [a,b,*], Kris Boudt [c,d]

[a] Département de finance, assurance et immobilier, Université Laval, Québec, Québec, Canada
[b] Centre interuniversitaire sur le risque, les politiques économiques et l'emploi, Québec, Québec, Canada
[c] Solvay Business School, Vrije Universiteit Brussel, Belgium
[d] Faculty of Economics and Business, VU University Amsterdam, The Netherlands

ARTICLE INFO

Article history:
Received 27 November 2014
Accepted 26 February 2015
Available online 5 March 2015

JEL classification:
C12
C15
C22
C52

Keywords:
Bootstrap test
Hedge fund
Modified Sharpe ratio
Non-normal returns
Performance measurement

ABSTRACT

The modified Sharpe ratio is commonly used to evaluate the risk-adjusted performance of an investment with non-normal returns, such as hedge funds. In this note, a test for equality of modified Sharpe ratios of two investments is developed. A simulation study demonstrates the good size and power properties of the test. An application illustrates the complementarity between the Sharpe ratio and modified Sharpe ratio test for performance testing on hedge fund return data.

Crown Copyright © 2015 Published by Elsevier Inc. All rights reserved.

1. Introduction

Ledoit and Wolf (2008) recommend a bootstrap method to test equality of Sharpe ratios between two funds, accounting for the finite sample properties of the return distribution and for the potential autocorrelation and heteroskedasticity. If one of the funds has non-normally distributed returns,

☆ We are grateful to the Editor (Ramazan Gençay), an anonymous referee, Peter Carl, Michel Dubois, Ivan Guidotti, Lennart Hoogerheide, Simon Keel, Jeremy Kolly, Doug Martin, Enrico Schumann and participants at various conferences and seminars for useful comments. Financial support from aeris CAPITAL AG, IFM2 Montréal, and the Dutch science foundation is gratefully acknowledged. The views expressed in this paper are the sole responsibility of the authors. Any remaining errors or shortcomings are the authors' responsibility.

* Corresponding author at: Département de finance, assurance et immobilier, Université Laval, Québec, Québec, Canada.
E-mail addresses: david.ardia@fsa.ulaval.ca (D. Ardia), kris.boudt@vub.ac.be (K. Boudt).

http://dx.doi.org/10.1016/j.frl.2015.02.008
1544-6123/Crown Copyright © 2015 Published by Elsevier Inc. All rights reserved.

comparing funds based on the Sharpe ratio is often not enough, as it ignores investors' positive preferences for odd moments and aversion to even moments. This weakness of the Sharpe ratio is well known and several alternatives have been proposed. For the analysis of hedge fund returns, the modified Sharpe ratio proposed by Favre and Galeano (2002) and Gregoriou and Gueyie (2003) is now increasingly popular. It is defined as the ratio between the average excess return of the fund and its modified Value-at-Risk. The latter is an estimator for Value-at-Risk based on the Cornish–Fisher expansion and the first four moments of the return distribution. The modified Sharpe ratio has been frequently used in research on performance of investments with non-normal returns such as hedge funds (see e.g., Amenc et al., 2003; Bali et al., 2013; Eling and Schuhmacher, 2007).

While there exist many risk-adjusted return measures to evaluate the performance of a single fund, previous research seems to have focused only on testing the equality of the Sharpe ratio of two funds (Jobson and Korkie, 1981; Memmel, 2003; Ledoit and Wolf, 2008). We develop a similar test for the modified Sharpe ratio. Compared to other performance measures taking the non-normality of the return distribution into account, the modified Sharpe ratio has the advantage of being asymptotically normal with an explicit function for its standard error. For small samples, we describe a bootstrap procedure to obtain the p-values corresponding to the studentized test statistic, accounting for the finite sample properties of the return distribution and the potential autocorrelation, heteroskedasticity and cross-dependence. The validity of the proposed methodology is verified through a Monte Carlo study. In the empirical application on the relative performance of hedge funds over the period 2008–2012 we find that, especially for hedge funds pursuing a Relative Value investment style, returns are non-normal leading to up to 22% of disagreement between the Sharpe and modified Sharpe ratio regarding equal-performance. For the other funds disagreement between the two tests ranges between 5% and 14%.

2. Testing equality of modified Sharpe ratios

Gregoriou and Gueyie (2003) define the modified Sharpe ratio as the ratio between the excess return of the fund and its modified Value-at-Risk (mVaR):

$$mSR_i(\alpha) \equiv \frac{m_i - r_b}{\text{mVaR}_i(\alpha)}, \qquad (1)$$

where m_i is the population mean return for fund manager i and r_b is the mean return on a benchmark asset at the corresponding horizon. Modified VaR approximates the VaR under the true (unknown) distribution with the second order Cornish–Fisher expansion. Let R_i be the return of fund manager i. Denote the q-th centered portfolio moment $m_{q,i} \equiv \mathbb{E}\left[(R_i - m_i)^q\right]$, with $m_i \equiv \mathbb{E}[R_i]$. For a loss probability α, the modified VaR is:

$$\text{mVaR}_i(\alpha) \equiv -m_i + \sqrt{m_{2,i}}\left(-z_\alpha - \frac{1}{6}(z_\alpha^2 - 1)s_i - \frac{1}{24}(z_\alpha^3 - 3z_\alpha)k_i + \frac{1}{36}(2z_\alpha^3 - 5z_\alpha)s_i^2\right), \qquad (2)$$

with $s_i \equiv m_{3,i}/m_{2,i}^{3/2}$ the skewness, $k_i \equiv m_{4,i}/m_{2,i}^2 - 3$ the excess kurtosis, and z_α the α-percentile of the standard normal distribution. Note that, for the mSR in (1) to be correctly defined, it is required that $\text{mVaR}_i(\alpha)$ is strictly positive. For loss probabilities α of 5% and 10%, this will be almost always the case for realistic return distributions. Also of interest is the skewness-kurtosis boundary derived by Jondeau and Rockinger (2001) to ensure that the corresponding Cornish–Fisher density approximation is everywhere positively valued.

Gregoriou and Gueyie (2003) set α to 5%. Favre and Galeano (2002) consider an α of 1% and 5%. Other authors, like Jaschke (December 2002) and Boudt et al. (2008), warn against the use of small values of α, based on the fact that the Cornish–Fisher approximation of the quantile function becomes less and less reliable for $\alpha \to 0$. For small estimation samples, this so-called "wrong tail behavior" of the Cornish–Fisher approximation is likely to be aggravated by the estimation error in the moments of the return distribution. We therefore follow Jaschke (December 2002) and Boudt et al. (2008) and recommend testing for equal-performance using the mSR at higher values of α, such as 5% and 10%.

Download English Version:

https://daneshyari.com/en/article/5069574

Download Persian Version:

https://daneshyari.com/article/5069574

Daneshyari.com