Araştırma Makalesi / Research Article

Performans Oranlarının Önem Ağırlıkları: Hedge Fonların Entropi Yöntemiyle İncelenmesi

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Öz

Bu çalışmada Ocak 1999-Mayıs 2019 döneminde faaliyet gösteren hedge fonların verileri kullanılarak performans oranlarının önem ağırlıkları incelenmek istenmiştir. Çalışmada hedge fon yatırımcılarının yüksek olmasını bekledikleri bilgi, Calmar, Jensen'in alfası, m-kare, Sharpe, Sortino ve Sterling oranları hesaplanmış, bu oranların önem ağırlıkları çok kriterli karar verme yöntemlerinden biri olan Entropi yöntemi ile belirlenmiştir. Sonuçlar Sortino, Sterling ve Jensenin alfası oranlarının önem ağırlıklarının diğer oranlardan daha yüksek olduğunu göstermektedir.

Anahtar Kelimeler: *Performans Oranları, Entropi Metodu, Hedge Fonlar, Getiri, Risk*

JEL Kodları*: C02, G00, G10*

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Importance Weights of Performance Ratios: Analyzing Hedge Funds by Entropy Method

Abstract

In this study, it is aimed to examine the importance weights of performance ratios by using the data of hedge funds operating in the January 1999-May 2019 period. In the study information, Calmar, Jensens alpha, m-square, Sharpe, Sortino and Sterling ratios, which hedge fund investors expect to be high, were calculated, and the importance weights of these ratios were determined by the Entropy method, which is one of the multi-criteria decision-making methods. The results show that Sortino, Sterling, and Jensen's alpha ratios have higher importance weights than other ratios.

Keywords: *Performance Ratios, Entropy Method, Hedge Funds, Return, Risk*

JEL Codes: *C02, G00, G10*

1. Introduction

Hedge funds are freely regulated mutual funds, which are established as limited partnerships and whose participation shares are taken by qualified or institutional investors. Hedge funds, referred to as major players of the markets, typically receive a 20% (typically) profit in addition to a fixed fee representing 1-3% of the assets they manage to cover current expenses (Engert, 2010). These funds, aim for absolute returns independent of market indices. Hedge funds follow mispriced stocks in the market (Cao et al. 2017). Since hedge fund returns are not highly correlated with the returns of traditional portfolios, these funds may bring a significant and permanent diversification advantage (Smith, 2017). On the other hand, hedge funds have some disadvantages. Hedge funds are not liquid. (Getmansky et al. 2004). Some hedge funds distort monthly returns to avoid reporting losses (Bollen and Pool (2009), opportunistically inflate their returns to increase the performance fee, and show the December return high (Agarwall et al. 2011). Moreover, hedge funds tend to be strategic in the timing of disclosures to public databases, delaying reporting underperformance, and they are found to expect to offset lower returns with better returns in the following months (Aragon and Nanda 2017).

In the literature, different ratios related to the performance of hedge funds have been used, and these funds have been examined from different perspectives. When the risk-adjusted performance measurement ratios related

to the performance of hedge funds are not taken into account, it has been observed that these funds provided an average net return of 9.2% to 16.1% in the 1988-1995 period (Ackermann et al. 1999). Since 1994, large databases have started to hide the data of dead funds, so the illusion of survival has been eliminated and the data of dead funds have been used in performance analysis (Watanabe, 2010). In the period of 1995-2004, hedge funds that did not catch alpha were liquidated over time, while those that did catch alpha managed to continue their activities (Fung et al. 2008). Hedge funds generally do not outperform the market (Canepa et al. 2020). Hedge funds with managerial skills performed well in rising and falling markets in the 1994-2014 period (Sun et al. 2018; Zheng and Osmer 2018). However, hedge fund managers' ability to anticipate and use disruptive market events is not very strong (Chelikani et al. 2019). Hedge funds that apply leveraged transactions with derivative instruments have lower annual performance (Januzzi et al. 2020). Only 2.68% of hedge funds are truly talented, 33.20% are unskilled, and the rest have not caught alpha (Maladi, 2020). Information ratio, appraisal ratio, Jensen's alpha, m-square ratio, Sharpe ratio, Sortino ratio and Treynor index can be manipulated by portfolio managers (Goetzmann et al. 2007). When evaluating hedge fund performance with Sharpe ratios, market portfolio and higher co-occurrences (together skewness and combined kurtosis) should be taken into account (Knif et al. 2020). Looking at Sharpe, alpha and information ratios, hedge funds have superior long-term risk-adjusted performance in the 1994-2013 period (Duanmu et al. 2018). In the same period, there is a positive relationship between the size of hedge funds and their performance in alpha and Sharpe ratios (Joenväärä et al. 2019). When these ratios are considered by adding the valuation ratio, the performance of hedge funds is permanent in weak markets and not permanent in strong markets (Sun et al. 2018).

There are many ratios adapted to the systematic or total risk related to the performance of hedge funds. Hedge fund participants shape their investment decisions according to the performance ratios they expect to be high. Despite the large number of performance ratios, it is thought that the importance weights may differ as these ratios are adjusted for different risks. Determining and calculating the performance measurement ratios based on systematic risk and total risk, which hedge fund investors expect to be high, and examining the importance weights of these ratios in a wide period covering different periods of the markets will fill one of the gaps in this area. In this context, it is aimed to examine the importance weights of performance measurement ratios in the study. In this study, considering the studies in the literature, the performance ratios that are frequently shared by hedge funds

were calculated using Thomson Reuters and Takasbank data, which were not included in previous studies, and the importance weights of these ratios were examined.

The remainder of the study is structured as follows. A discussion of the data and variables used in the study will be carried out. Data attributes are presented in this section. The methodology used to analyze the data and a discussion of the results will then be presented. The last section concludes this study.

2. Data and Measurement of Variables

Hedge fund data for Turkey were obtained from Takasbank, hedge fund, treasury bills and market data of other countries were obtained from Thomson Reuters database, and performance measurement rates shared by hedge funds were obtained from the web pages of the funds. The collected data were classified for statistical analysis. In order to examine the importance weights of the performance measurement ratios shared by hedge funds, information, Calmar, Jensen's alpha, m-square, Sharpe, Sortino and Sterling ratios were calculated by using 3,272 hedge funds, treasury bills and market data operating in 38 countries between January 1999-May 2019.

Since the calmar and Sterling ratios used in the performance analysis were calculated with 36-month returns, the backfill bias was also eliminated, hedge funds with a net return of 36-245 months were used in the study. In order to eliminate the survival bias, 175 funds that stopped reporting or ceased operations were included in the sample.

The top 3 countries with the highest number of hedge funds among the countries in which performance analysis was made are the Cayman Islands with 911 funds, the USA with 565 funds, and Canada with 284 funds. In Figure 1, the numbers of hedge funds and other countries for which performance analysis was made are given.

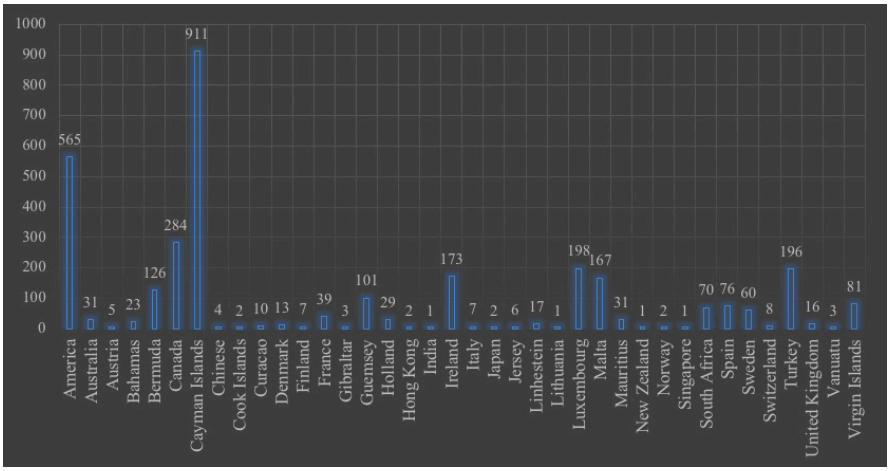

Figure 1. Countries Whose Hedge Funds are Examined and the Number of Hedge Funds

The top 4 ratios that hedge funds share the most about their performance on their web pages are Sharpe ratio (21%), Sortino ratio (17%), Jensens alpha (15%) and information ratio (15%).

Figure 2. The Performance Ratios Shared by Hedge Funds Regarding Their Performance From Their Web Pages

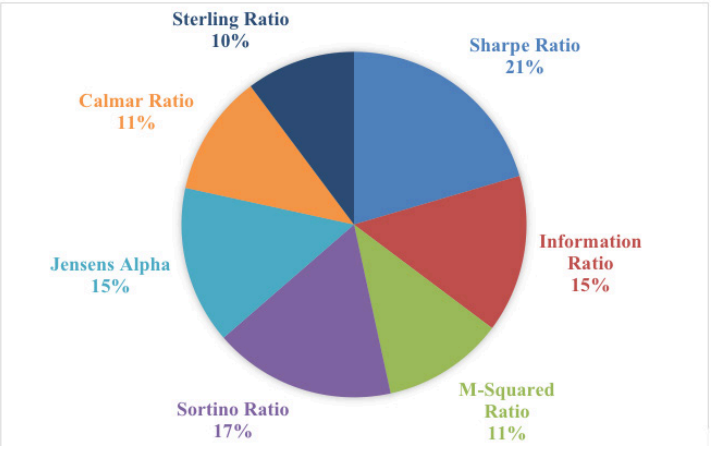

Table 1. Formulas of Calculated Performance Ratios

Total Risk Adjusted Performance Ratios
$Sharpe\ Ratio = \frac{r_P - r_f}{\sigma_p}$
$Information\ Ratio = \frac{r_P - r_f}{\sigma_{rp-rf}}$
$M^2 = r_f + (Sharpe\ Ratio\ X\ \sigma_m)$
$Sortino\ Ratio = \frac{r_P - r_f}{\sigma_d{}^3}$
$Calmar\ Ratio = \frac{r_P - r_f}{MDD^4}$
$Sterling\ Ratio = \frac{CR^5}{ALDD^6}$
Systematic Risk Adjusted Performance Ratio
Jensen's Alpha = $r_p - [r_f + \beta_p (r_m - r_f)]$

Descriptive Statistics of Hedge Fund Returns

Hedge funds have a negative return average for 4 years in 2008, 2011, 2015 and 2018, while the S&P 500 has a negative return average for 7 years in 2000, 2001, 2002, 2008, 2011, 2015 and 2018. It is observed that hedge funds have less negative average returns compared to S&P 500 returns.

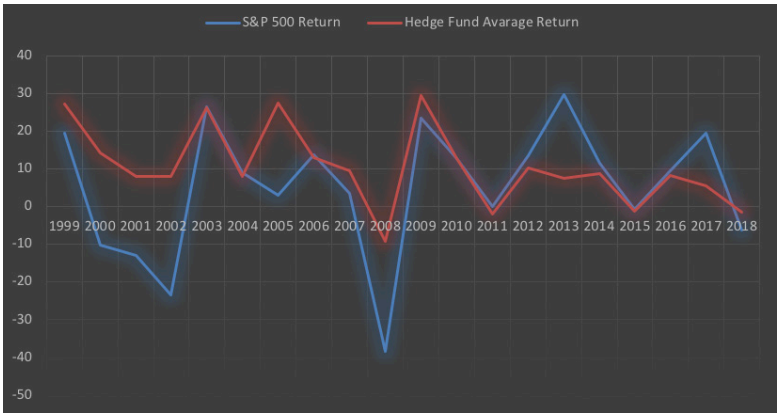

Figure 3. S&P 500 % Return and Average Hedge Fund % Return by Years

3 Standard deviation of the downside

4 Maximum drawdown

5 Compounded Return

6 Average largest drawdown

Table 2: Descriptive Statistics of Hedge Fund Performance Ratios

Statistics/Ratios*	Sharpe Ratio	Information Ratio	M-Squared Ratio	Sortino Ratio	Jensen's Alpha	Calmar Ratio	Sterling Ratio
Mean	0.37	0.38	8.63	1.49	7.57	7.04	5.53
Min	-0.13	-0.13	0.37	-0.38	-1.53	0.20	-1.57
Max	2.80	3.00	15.86	11.13	33.51	31.36	29.70
SD	0.18	0.19	3.14	1.72	5.37	4.41	4.35
Skewness	-0.21	0.06	-0.11	2.98	1.58	2.04	2.07
Kurtosis	0.15	0.72	-0.06	10.57	4.32	7.51	7.77

*) January 1999-May 2019 period.

Low or negative performance rates of hedge funds, which show similar results with previous studies, can be interpreted as the performance of these funds will continue to be discussed.

3. Methodology and Data Analysis

According to the information theory, entropy is a measure of uncertainty about random variables (Zhang et al., 2011). The entropy method consists of the following steps (Shemshadi et al., 2011).

Step 1: Creating the Decision Matrix

First, a decision matrix is created for 3,272 hedge funds.

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix} \quad (1)$$

Step 2: Obtaining the Normalized Decision Matrix

In order to convert the criteria values to common units, normalization is performed according to the characteristics of the criteria. In this step, the following formula (Equation 2) is used:

$$r_{ij} = \frac{x_{ij}}{\sum_{i=1}^{j} x_{ij}} \quad (2)$$

The normalized decision matrix is obtained as a result of the normalization process performed by using the equation (2).

Step 3: Finding Entropy Values Related to Criteria

From this step, the Entropy values of the criteria are by using the equation (3) shown below:

$$e_j = -k \sum_{j=1}^{n} r_{ij} . \ln(r_{ij}) \, (i = 1,2,\dots,m \text{ and } j = 1,2,\dots,n) \quad (3)$$

Table 3. *ej* Values Related to the Criteria

Sharpe Ratio	Information Ratio	M-Square Ratio	Sortino Ratio	Jensen's Alpha	Calmar Ratio	Sterling Ratio
0,9812	0,9801	0,9890	0,9140	0,9599	0,9688	0,9528

Step 4: The Following Equation is Used to Calculate the Differentiation Degree (D_j) of Information.

$$d_j = 1 - e_j \qquad (i = 1,2,\dots,m \text{ and } j = 1,2,\dots,n) \tag{4}$$

The high d_j values obtained by using Equation (4) indicate that the distance or differentiation between alternative ratios related to the criteria is high.

Table 4. *dj* Values Related to the Criteria

Sharpe Ratio	Information Ratio	M-Square Ratio	Sortino Ratio	Jensen's Alpha	Calmar Ratio	Sterling Ratio
0,0188	0,0199	0,0110	0,0860	0,0401	0,0312	0,0472

Step 5: Entropy Criterion Values Are Obtained from This Step by Using the Following Formula.

$$w_j = \frac{i - e_j}{\sum_{i=1}^{n}(1-e_j)} \tag{5}$$

The performance ratios with the highest importance weights are respectively the Sortino ratio with 33.83%, the Sterling ratio with 18.57% and the Jensen's alpha with 15.79%.

Table 5. Entropy Criteria Weights of Performance Ratios

Sharpe Ratio	Information Ratio	M-Square Ratio	Sortino Ratio	Jensen's Alpha	Calmar Ratio	Sterling Ratio
0,0739	0,0782	0,0431	0,3383	0,1579	0,1228	0,1857

4. Conclusion

In the study, performance ratios were calculated by using the data of hedge funds operating in the period of January 1999-May 2019. The result of hedge fund performances generally lagging behind expectations is in line with Chelikani et al. 2019, Canepa et al. 2020 and Maladi 2020, different with Duanmu et al. 2018. In our study, the importance weight of Sortino, Sterling and Jensen's alpha ratios were found to be higher than other ratios. In this context, hedge fund investors can focus on performance ratios with high importance weights. It is noteworthy that the Sortino ratio was the highest among the 7 ratios, with a rate of 33.83%. This situation revealed the

importance of the standard deviation of the returns below the risk-free returns in the denominator of the Sortino ratio. This can be explained by the frequency of hedge funds' returns under risk-free returns. Because, 3,272 hedge funds, whose 20 years were examined, have a negative return average of 4 years.

The performance rates calculated in the study are similar to those of Goetzmann et al. 2007. However, it has been found that the Sharpe ratio is commonly calculated in the literature and hedge funds are handled from different perspectives. In this context, the low importance of this ratio indicates that other ratios should also be taken into account.

In 2000, 2001 and 2002, when the S&P 500 had negative returns, hedge funds had a positive return average. In the following period, with the effect of the global financial crisis in 2008, it was observed that these funds had a negative average return. Considering the negative returns in 2011, 2015 and 2018, it can be interpreted that hedge funds can sometimes provide returns independent of market returns, and sometimes they cannot provide returns independent of market returns.

It has been determined that 1.680 of the 3,272 hedge funds examined in the study are in island countries. The fact that a significant part of hedge funds are in these island countries, which are also known as tax havens, make it difficult to answer questions such as how much assets these funds manage and how transparent they are.

In future studies, the same performance ratios can be calculated for other mutual funds and the importance weights of these ratios can be examined or island country hedge funds comparable to the performance of other hedge funds.

Araştırma ve Yayın Etiği Beyanı

Etik kurul izni ve/veya yasal/özel izin alınmasına gerek olmayan bu çalışmada araştırma ve yayın etiğine uyulmuştur.

Araştırmacıların Katkı Oranı Beyanı (Researcher's Contribution Rate Statement)

Yazarlar makaleye eşit oranda katkı sağlamış olduklarını beyan eder. (The authors declare that they have contributed equally to the article.)

Araştırmacıların Çıkar Çatışması Beyanı (Researcher's Conflict of Interest Statement)

Bu çalışmada herhangi bir potansiyel çıkar çatışması bulunmamaktadır. (There is no potential conflicts of interest in this study.)

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