

Does the Management Fee Signal the Performance of Equity Investment Funds in Brazil?¹

Abstract

Objective: Analyze the relation between the management fee and the risk-adjusted performance before fees of active investment funds classified as Ibovespa and investigate if the difference in fees reflects differences in the value the funds create for the investor.

Method: Therefore, a panel regression was applied, using a pooled model in which the funds' risk-adjusted performance served as the dependent variable and the management fee as the explanatory variable. Then, other control variables were included in the regression. To measure the fund performance, the models of Carhart (1997) and Fama and French (1993, 2015) were used.

Results: The results appointed a negative relation between management fee and performance. This indicates that the funds in the sample that cover high fees generally perform worse for the investor. Hence, the different fees also reflect differences in the value the funds create for the investor. In addition, the net equity of a fund is positively related with its performance, while age is negatively related and the Anbima seal did not reveal statistical significance.

Contributions: This research adds to the results in the literature as follows: a negative relation is shown between management fee and performance, even when controlling for variables such as size, age and quality in terms of corporate governance. In addition, this relation exists independently of the model used to measure the fund performance; in addition, more current evidence is presented and for an emerging market. Also, evidence is provided that the best corporate governance practices are not related with the achievement of good performance.

Key Words: Investment funds; management fee; performance.

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1. Introduction

One of the major challenges for capital market investors is the assessment of different investment alternatives. Specifically for equity investment funds, evaluating their performance is one of the key steps in the decision-making process between whether to invest or not. This task is not so simple though, as several studies have shown that there are different characteristics of the funds that influence its performance, such as size, age and management fee (Pollet & Wilson, 2008; Gil-Bazo & Ruiz-Verdú, 2009; Castro & Minardi, 2009; Milani & Ceretta, 2013).

Given the importance of understanding the factors influencing fund performance, studies such as Chen, Hong, Huang and Kubik (2004) and Pollet and Wilson (2008) analyzed the relationship between fund size and the achievement of good performance. Chen et al. (2004) argue that, as funds grow, diseconomies of scale emerge that corrode performance. On the other hand, in Brazil, Castro and Minardi (2009) found a positive relationship between size and performance.

The age of the fund is also analyzed as a variable that relates to performance. In a way, the fund's age measures its survival in the market and the loyalty of its investors (Golec, 1996). Thus, a positive relationship between age and performance is expected and was found in the studies by Milani and Ceretta (2013) and Alda, Andreu and Sarto (2017).

With regard to fees, it is known that the management and maintenance of a fund generate costs, and these are distributed to the stockholders through the fees, which may be: management fees, performance fees and entrance and exit fees. Gil-Bazo and Ruiz-Verdú (2009) argue that, as the main service a fund provides is portfolio management, the fees they charge should reflect their risk-adjusted performance. Also according to them, "in a well-functioning mutual fund market, fund fees should be positively correlated with risk-adjusted expected returns before fees" (p. 6).

Despite the apparent positive relationship between fees and performance, studies developed in the American market evidence a negative relationship between the management fee and the performance of equity investment funds (Gil-Bazo & Ruiz-Verdú, 2009; Vidal, Vidal-García, Lean & Uddin, 2015). This divergence from the initial idea made the authors consider this relationship as anomalous.

Based on the evidence from previous work, Mansor, Bhatti and Ariff (2015), analyzing Malaysian funds, point out that the imposition of fees has an unfavorable impact on fund performance, regardless of the type of fee charged, with higher fees being related to the low performance of fund returns. The results of these authors also demonstrated a negative relationship between fees and fund returns, both for Islamic funds (funds that limit investments based on faith-based ethical issues) and for conventional funds (other funds that do not use ethical restrictions in portfolio formation).

Given the apparently intriguing results found for the relationship between fees and performance in the US funds market, the main objective in this study is to analyze if this same relation can be verified in the Brazilian fund market, considering the equity investment funds classified as Ibovespa, and to investigate whether the difference in fees reflect differences in the value that the funds create for the investor. Therefore, a panel regression was applied using a pooled model and, later, using the Fama-MacBeth model, with performance adjusted to the funds' risk as a dependent variable and the management fee as the explanatory variable. The results showed that the negative relationship observed in the US market between management fee and performance can also be observed in the Brazilian market.

This research is justified because the investment fund industry represents an important market for Brazil. This industry has shown significant growth over the last few years. According to data from the Brazilian Association of Financial and Capital Market Entities (Anbima, 2016), the consolidated net worth of the investment funds in January 2017 exceeded 3 trillion *reais*, which corresponds to more than 50% of the country's Gross Domestic Product (GDP); in contrast, in December 2004, this equity corresponded to approximately 600 billion, thus showing the great increase in the amount of resources Brazilian investment funds have managed over the years.

In addition, active funds seek to achieve the highest possible return in their category, as opposed to the passive funds, which follow a certain indicator. Also, active management requires greater management effort with further research and elaboration of more sophisticated strategies, increasing the cost of management, consequently raising the value of the management fee. The main question is whether the rising cost of management is offset by performance increases.

The number of Brazilian studies on this subject is scarce, especially with regard to the evaluation of the relationship between the fees the funds charge to the investor and their performance. Therefore, a broader debate is necessary in the literature, expanding the findings of other works. In this regard, the studies of Dalmácio, Nossa and Zanquetto Filho (2007) and Dalmácio, Nossa, Louzada and Santanna (2010) can be cited, who analyzed if the management fee and the performance fee are related with the performance of the equity funds. This study differs by presenting a more current database and using the four-factor model by Carhart (1997) and the three and five-factor models by Fama and French (1993, 2015) to calculate fund performance. In addition, control variables are tested to investigate the robustness of the relationship between management fees and performance. Thus, this research aims to contribute to the Brazilian literature in order to fill the gaps in this field of study.

The choice of Carhart's four-factor model (1997) and Fama and French's (1993, 2015) three and five-factor models to measure fund performance is justified, the former being one of the most used models by authors who discuss the performance evaluation of funds (Chen et al., 2004; Gil-Bazo & Ruiz-Verdú, 2009; Castro & Minardi, 2009; Vidal et al., 2015). The five-factor model of Fama and French (2015), being a more current model, was used as a complementary and test model, which constitutes a contribution of this article. Finally, the model of Fama and French (1993) was also used as a complementary analysis, following the procedure of other authors, such as Chen et al. (2004) and Gil-Bazo and Ruiz-Verdú (2009).

This research extends the results of the literature as follows: it shows that there is a negative relationship between management fee and performance, even when controlling for variables such as size, age and quality in terms of corporate governance. In addition, this relationship exists independently of the model used to measure fund performance. In addition, it presents more current evidence and for an emerging market. In addition, it provides evidence that there is no relationship between best corporate governance practices and the achievement of good performance.

In practical terms, this research shows that investors should pay attention to the value of the management fee when selecting an active investment fund to invest in, as this may erode the performance delivered to the shareholder. Similarly, managers need to pay attention to managers' practices in order to minimize the management cost as much as feasible, in order to reduce the management fees and deliver better performance.

2. Literature Review

2.1 Management fee and the performance of the funds industry in Brazil

The collective application of resources through investment funds provides investors with a number of benefits, such as access to markets that are unlikely to be accessed individually; greater diversification of risks; professional management; and safer investments. Milani and Ceretta (2013) point out that the main advantage of a fund is to provide specialized management for inexperienced investors.

Brazilian funds, in addition to significant growth, also show greater diversification in the management of the resources managed. In 1980, the funds invested only in equity; in 2000, then, fixed income investment funds prevailed. Data from Anbima (2017) show that 48% of total industry equity is in fixed income funds, while 4.3% is in equity funds; in 2000, 87% of the total equity of the industry was in fixed income funds.

Brazilian industry ended the year 2015 with 3 trillion in net worth, capturing 7 billion in the domestic market, which turned it into the seventh largest resource management industry in the world in 2014, according to information from the Brazilian Financial and Capital Markets Association (Anbima) and the Getúlio Vargas Foundation (FGV) (2016).

In terms of regulation, the Brazilian Securities and Exchange Commission (CVM) is primarily responsible for the Brazilian funds industry and published the new CVM Instruction 555 in 2014, which replaces CVM Instruction 409/2004, simplifying rules and the structure of the investment funds themselves and defining concepts and characteristics of the funds and types of investors. In addition to the CVM, Anbima also self-regulates the Brazilian fund industry, compiling and providing information and data about it.

There is a wealth of literature on performance, whether risk-adjusted or not, generated by the active management of investment funds, especially in the United States, where the industry is more developed and more representative (Sharpe, 1966; Jensen, 1968; Grinblatt and Titman, 1989, among others), but this literature has hardly discussed one of the main costs of managing investment funds for stockholders. Grinblatt and Titman (1989) argue that fees (management and performance) and transaction costs ultimately dilute the abnormal returns the fund managers generate. According to this study, one can observe abnormal performance (above average) only by examining gross returns, from which transaction costs, fees or other expenses have not been subtracted yet. Their study compared the abnormal return of active and passive investment strategies, with and without transaction costs, fees and expenses, for the period 1975-1984.

Dellya and Olson (1998) investigated the relationship between the various fees the funds charged and the performance adjusted to their risk. The sample consisted of mutual equity funds from 1987 to 1992. They concluded that funds with sales commission charges (charged at the time of purchase, front-end load) obtained lower risk-adjusted performance than funds without this charge. In addition, that 12b-1 (annual marketing) fees, deferred sales costs and redemption fees increase fund expenditures and only a limited number of funds achieve risk-adjusted performance to justify them. The authors also point out that the absence of fees cannot be interpreted as a sign of superior performance, as most funds that do not charge a fee also gain on average risk-adjusted negative returns.

Gil-Bazo and Ruiz-Verdú (2009) investigated whether the differences in the rates charged by the funds reflected differences in the values these funds create for the investor. They used a sample of investment funds in active management stock from December 1961 to December 2005, excluding from the sample passive and institutional funds. The authors used regressions of the surplus return before the fees on the risk factors of the Carhart model (1997); they also used the three-factor model of Fama and French (1993) and the Fama-MacBeth procedure. Their results showed that there is a negative relationship between the fees charged by the funds and their performance. The authors attempted to explain the reason for this negative relationship by studying fund characteristics such as fund governance, operating cost, fund strategy and others.

Mansor et al. (2015) examined the comparative performance of two types of funds - Islamic funds (faith-based ethical funds) and conventional funds (other funds that do not use ethical filtering in portfolio formation) - to find out if investor returns are affected by different rates and if the returns are significantly different. At the same time they investigated whether there is evidence of the market timing ability of fund managers. They used a sample of 106 equity funds in Malaysia between 1990 and 2009. They concluded that the fees, no matter whether they are compulsory, expense fees or both, significantly affect the equity fund performance, reducing the performance and the investors' return. In addition, they also rejected the managers' market timing skills, which they appointed as one of the justifications for charging high rates.

Vidal et al. (2015), seeking to understand the relationship between fund fees and the predictability of returns, examined the relationship between individual fund returns and fees, controlling for various macroeconomic variables. They analyzed monthly returns of 37,166 registered US funds (restricted to active management funds), using four macroeconomic variables to consider variations in business conditions, such as: default spread, dividend yield, one-month treasury bill fee and term spread (difference between income from treasury bills of ten years and three months). The authors used Carhart's four-factor model (1997) to calculate the performance of funds before fees. Their results showed that there is a negative relationship between the fund performance before fees and the fees they charge to investors. In addition, they found that the funds show evidence of predictability of negative returns for expense fees, i.e. lower net performance would be expected in the future from funds with higher fees.

Haque and Ahmed (2015) studied the relationships between the conditional and unconditional abnormal returns generated by the Australian fund managers and the expenses they incurred. The authors used monthly returns, net of expenses from June 1992 to December 2013. Abnormal returns were assessed using the model of Fama and French (1993) and an augmented version of this model to include the period of recession and booming of the market. They found that Australian retail funds charging high rates generate relatively low post-fee risk-adjusted returns, both unconditionally (regardless of market condition) and under poor economic conditions. They concluded that Australian funds charge more in fees than they generate in returns for investors when the risk is accounted for, both under strong and weak economic conditions.

Among the studies carried out in the Brazilian market, Dalmácio et al. (2007) aimed to find out if the management fee attributed to investment fund management institutions is related to the performance (risk x return) of these funds. For this purpose, they analyzed the active Ibovespa and IBrX equity funds in the period from May 2001 to December 2003. Based on the data, the authors calculated the volatility and the Sharpe Index used as an indicator of performance; then, they associated the management fee to the respective Sharpe indices of each fund and calculated the linear correlation coefficient and Pearson's moment-to-product correlation coefficient between these variables. They found that there is no relationship between the management fee and the performance of the active Ibovespa equity funds and that there is weak correlation between the management fee and the performance of the active IBrX equity funds.

Dalmácio et al. (2010) investigated whether there is a relationship between the performance fee charged by the fund manager and the performance (risk x return) of these funds. For this reason, they analyzed the Brazilian active Ibovespa equity funds from May 2001 to December 2003. The authors compared the averages between the 32-month profitability of the funds that charge a performance fee against the 32-month profitability of the funds that do not charge this fee. They also analyzed the volatility and Sharpe's index of these funds by means of comparison using a t-test. The conclusion of this study was that there is no relationship between the performance fee charged by asset management institutions and the performance (risk x return) of these funds. The study showed that there is no evidence to state that the profitability of funds that charge performance fees is greater than the profitability of those that do not charge those fees.

Chart 1 summarizes the studies presented, demonstrating the main objectives and results found in the literature regarding the relationship between the management fee and the performance of investment funds.

Author	Year	Objective	Main Results
Grinblatt and Titman	1989	Compare the abnormal return of active and passive investment strategies, with and without transaction costs, fees and expenses in the period 1975-1984.	Abnormal (above-average) performance can be observed by simply examining the gross returns, from which transaction costs, fees or other expenses have not been subtracted yet.
Dellva and Olson	1998	Investigated the relation between the different fees the funds charge and the risk-adjusted performance.	Funds with sales commission charges (charged front-end load) achieve lower risk-adjusted performance than funds without this charge. In addition, 12b-1 fees (annual marketing fee), deferred sales costs and rescue fees increase the fund expenses and only a limited number of funds achieve a risk-adjusted performance able to justify them.
Dalmácio et al.	2007	Investigated if the management fee charged by the investment fund management institutions is related with the performance (risk x return) of these funds.	Verified that there is no relation between the management fee and the performance of the Ibovespa ativo stock funds and that a weak correlation exists between the management fees and the performance of the IBrX ativo stock funds.
Gil-Bazo and Ruiz-Verdú	2009	Investigated if the differences in the fees the funds charged reflected differences in the values these funds create for the investor.	Showed that a negative relationship exists between the charges the funds cover and their performance.
Dalmácio et al.	2010	Investigated the existence of a relation between the performance fee, charged or not, by the fund manager and the performance (risk x return) of these funds.	Concluded that there is no relation between the performance fees charged or not by the management institutions of the active stock funds and the performance (risk x return) of those funds.
Mansor et al.	2015	Examined the comparative performance of two types of funds (Islamic funds and conventional funds), aiming to discover if the different fees affect the investors' returns and if the returns are significantly different, also looking for proof of the fund managers' market timing capacity.	Concluded that the fees, whether compulsory, expense fees or both, significantly affect the performance of stock funds, reducing the performance and the investors' return. In addition, they also rejected the managers' market timing skill, which they appointed as one of the justifications for charging high fees.
Vidal et al.	2015	Aimed to understand the relationship between the fund fees and the predictability of the returns and examined the relation between the individual returns of the funds and the fees, controlling for several macroeconomic variables.	Its results showed that a negative relationship exists between the fund performance before the fees and the fees they charge the investor. In addition, they concluded that the funds show evidence of predictability of negative returns for expense fees.
Haque and Ahmed	2015	Studied the relations between the conditional and unconditional abnormal returns produced by the managers of Australian equity investment funds and the expenses they charge.	Discovered that the Australian retail funds that charge high fees produce relatively low post-fee risk-adjusted returns, both unconditionally (independent from the market condition) and in weak economic conditions.

Chart 1. Synthesis of main results found in the literature concerning the management fee and performance of investment funds

Source: created by the authors

2.2 Performance assessment models

Since Modern Portfolio Theory, proposed by Markowitz (1952), much has been discussed about the process of portfolio construction and evaluation. The performance evaluation of a portfolio is one of the parts of an investor's decision-making process between investing or not.

Investment fund performance measuring is done with the aid of mathematical models. Jensen (1968), in evaluating the performance of funds, proposed an evaluation measure that corresponded to the intercept of the regression obtained through the use of the capital asset pricing model (CAPM). This measure was known as Jensen's alpha and represents the abnormal return achieved by the fund.

The CAPM model, however, despite being a widely used model, undergoes several points of criticism (Ross, 1976; Roll, 1977; Fama and French, 1996). Ross (1976) argues that the model has inconsistencies in considering a single measure of risk in asset valuation. Thus, in the literature, other models have emerged to expand on the CAPM model and its explanatory power.

Fama and French (1993) proposed adding two additional factors to the CAPM model; a size factor and a book-to-market factor. According to these authors, investors would demand a premium not only for the market risk proposed by the CAPM model, but also for the risk related to the size of the company and the risk related to the book value indicator in relation to the market value.

Afterwards, Carhart (1997), when evaluating the predictability of investment fund performance, adds the momentum factor to the model proposed by Fama and French (1993). The momentum factor can be defined as the strategy to buy assets that have performed well in the previous months (short term) and to sell assets with low income in the same period. It will determine the manager's ability to keep up past positive and negative returns in the future.

More recently, Fama-French (2015) updated the three-factor model and created a five-factor model, incorporating two new risk factors into the first: profitability and investment.

The Brazilian and international studies have indicated preference for using Fama and French (1993) and Carhart's (1997) models to measure the performance of investment funds (Carhart, 1997; Chen et al., 2004; Gil-Bazo & Ruiz-Verdú, 2009; Casto & Minardi, 2009; Nerasti & Lucinda, 2016; Paz, Iquiapaza & Bressan, 2007).

3. Method

3.1 Description of sample data

The data for the analysis were collected in the database provided by Anbima, Sianbima 4.3.7. Information on funds classified as Ibovespa Activo was collected according to Anbima's new ranking of funds. For each fund, the value of the quota, the shareholders' equity and the start date of the fund were collected, as well as the code, name, management fee, performance fee and its return, on a monthly basis, considering the period from January 2009 to September 2015, chosen based on the availability of the data.

Following the procedures performed by Gil-Bazo and Ruiz-Verdú (2009) a restriction was established that, to remain in the sample, the fund should have at least 48 months of return data. Thus, all funds that had less than 48 months of return data were excluded from the sample. In addition, still following the authors' method, as a guarantee that the results were not influenced by differences between types of management or type of investor the funds are offered to, the sample consisted only of active and retail funds. Thus, the results can be compared with the literature.

3.2 Calculation of return before fees

To calculate the return before fees, the procedures by Castro and Minardi (2009) and Paz *et al.* (2017) were adopted. First, the monthly net return of each fee was calculated in accordance with Equation 1:

$$Net.Ret_{i,t} = \frac{Quota_{i,t} - Quota_{i,t-1}}{Quota_{i,t-1}} \quad (1)$$

Where:

- $Quota_{i,t}$ = quota value of fund i (R\$) at the end of month t;
- $Quota_{i,t-1}$ = quota value of fund i (R\$) at the end of month t-1;

After calculating the return net of fees, the gross monthly return (return before fees) was calculated according to Equation 2:

$$Gross.Ret_{i,t} = Net.Ret_{i,t} + ((1 + manfee)^{(1/12)} - 1) \quad (2)$$

The factor 1/12 is due to the fact that the information disclosed about the fees is detailed in annual terms. Therefore, the management fees were also transformed into monthly fees according to the model in Equation 3.

$$monfee_{i,t} = ((1 + manfee)^{(1/12)} - 1) \quad (3)$$

3.3 Fund performance estimation

To estimate the fund performance before the fees, Carhart's four-factor model was used (1997), similar to the procedures by Gil-Bazo and Ruiz-Verdú (2009). This model is described in Equation 4.

$$r_{i,t} - r_{f,t} = \alpha_{i,t} + b_{i,t}(r_{m,t} - r_{f,t}) + s_{i,t}SMB_t + h_{i,t}HML_t + p_{i,t}PRIYR_t + \varepsilon_{it} \quad (4)$$

Where:

- $r_{i,t} - r_{f,t}$ = return before fees of fund i in month t superior to the risk-free asset return in month t;
- SMB_t = *Small Minus Big* – premium for the size factor in month t;
- HML_t = *High Minus Low* – premium for the book value / market value factor (BV/MV) in month t.
- $PRIYR_t$ = *Prior 1-year momentum* – premium for the momentum factor in month t.
- ε_{it} = Error term of the model.

The factors used in the Carhart model (1997) were obtained through the construction of portfolios with all the Brazilian shares registered on BM & FBOVESPA. The procedures performed to construct the factors are described in section 3.3.1.

The estimation was performed in two stages. In the first stage, regressions were executed with all funds that had at least 48 months of return data. The excess return was reversed before the fees against the risk factors in the previous five years, in a moving window. Then, in the second stage of estimation, the risk-adjusted performance of fund i was estimated as the difference between the surplus return before interest rates and the realized risk premium, defined as the beta vector multiplied by the vector of realized factors in month t.

In addition, besides Carhart's (1997) model, Jensen's alpha was also calculated using the models of Fama and French (1993), which considers only three factors (market risk premium, size and book value/market value) and by the model of Fama and French (2015), which adds the profitability (RMW – Robust-Minus-Weak) and investment (CMA – Conservative-Minus-Aggressive) factors to the model of Fama and French (1993).

3.3.1 Construction of risk factors in Fama-French (1993, 2015) and Carhart (1997)

In order to estimate the factors used in the multifactor model, portfolios were constructed. All portfolios were established at the end of June of year $t-1$ (last trading day). The portfolios included all stocks listed on BM & FBOVESPA with available data, excluding financial institutions and companies that had negative book value.

The first factor, the market risk premium, was constructed as the difference between the monthly returns of the Ibovespa index and the risk-free monthly returns of the fee (CDI).

Similar to the procedure of Fama and French (1993), stocks were ranked according to size relative to the median of their market value in small and large. Soon after, the percentiles of the book value / market value ratio (BV/MV) were used to divide them into three groups: high ratio (> 70), neutral (between 70 and 30) and low ratio (< 30), resulting in six portfolios relating size and BV/MV ratio. According to Fama and French (2015), the SMB factor (BV/MV) is defined as the difference between the average monthly return of the three small stock market portfolios and the average monthly return of the three stock portfolios with large market capitalization (large stocks). This factor was also used for the Carhart model (1997) in this study.

Fama and French (2015) also present the variables SMB (profit.) and SMB (invest.), which are ways to verify the effect of size on profitability and investment. Thus, the SMB (profit.) is the average of the returns of three small and large portfolios, classified based on the percentiles of the operating profitability ratio (robust, neutral and weak), and the SMB (invest.) is the average of returns from three small and large portfolios, classified based on the percentiles of the investment ratio (conservative, neutral and aggressive). The percentiles remain the same (> 70 , between 70 and 30, < 30). Thus, the SMB factor for the model of Fama and French (2015) consists of the average of the returns of the three factors mentioned above - SMB (BV/MV), SMB (invest.), SMB (profit.).

The book value/market value (HML) factor was computed as the difference between the average monthly return of the two stock portfolios with high book value/market value (BV/MV) and the average monthly return of the two stock portfolios with low BV/MV index.

For the construction of the momentum factor in the Carhart (1997) model, with the same portfolios constituted for the three-factor model, the stocks were ranked based on the accumulated returns of the last 11 months and divided into two groups (winners and losers), based on the median of the accumulated returns. The momentum factor (MOM) is defined as the difference between the average monthly return on the two winning equity portfolios and the average return on the two losing equity portfolios.

The profitability factor (RMW) was calculated as the difference between the average monthly return on the two highly profitable equity portfolios and the average monthly return on the two poorly profitable equity portfolios.

The investment factor (CMA) was calculated as the difference between the monthly average return on the two low-investment portfolio (conservative) and the average monthly return on the two (aggressive) high-investment portfolios.

3.4 Econometric estimation

To answer the proposed research question, after calculating the risk-adjusted fund performance, a regression was calculated in which fund performance served as the dependent variable and the management fee as the explanatory variable. Gil-Bazo e Ruiz-Verdú (2009) applied a similar procedure.

A panel regression was performed using a pooled model, followed by the Fama-MacBeth model, as described in Equation 5.

$$\alpha_{it} = \delta_{0t} + \delta_1 manfee_{it} + \xi_{it} \quad (5)$$

Where:

- α_{it} = risk-adjusted performance before fees of fund i in month t;
- $manfee_{it}$ = management fee of fund i in month t;

The fund performance was measure using Jensen's alpha, obtained from Fama and French (1993), Carhart (1997) and Fama and French's (2015) models, all applied in the model of Equation 5.

Like the effect of the management fees, in other studies, empirical evidence was surveyed for additional variables affecting performance. In Chart 2, the variables chosen for use in this study have been summarized, aiming to test the robustness of the results, as well as the authors who used them and the results found for this relationship. It is highlighted that the expected relationship is based on the evidence found in background studies.

Variable	Specification	Source	Expected Relationship
Size	Natural logarithm of Net Equity of the Fund.	Chen et al.(2004); Milani and Ceretta (2013); Carneiro (2014); Paz, Iquiapaza and Bressan (2017);	+/-
Age	Number of years the fund has been functioning (calculated at the end of each period).	Milani and Ceretta (2013)	+/-
Management fee	Fee charged by some funds to cover management and other costs.	Gil-Bazo and Ruiz-Verdú (2009); Mansor et al. (2015); Vidal et al. (2015); Carneiro (2014); Paz et al. (2017)	-
Seal	Dummy variable: (1) Fund holds Anbima seal of regulation and best practices; (0) Fund does not hold Anbima seal.	Paz et al. (2017)	+

Obs.: Expected Relationship according to previous empirical evidence.

Chart 2. Empirical evidence of other variables influencing performance

Source: created by the authors

Thus, after estimating the effect of the management fees on performance, a new regression model was applied, now including the variables size (natural logarithm of fund equity), age (measured in years of activity of the fund), Anbima seal (proxy to measure the funds' compliance with best corporate governance practices) and management fee (management cost of fund). This model has been specified in Equation 6.

$$\alpha_{it} = \delta_{0t} + \delta_1 manfee_{it} + \delta_2 Siz_{it} + \delta_3 Age_{it} + \delta_4 Seal_{it} + \xi_{it} \quad (6)$$

The interquartile interval was analyzed to identify outliers, in accordance with other authors (Favero, Belfiore, Silva & Chan, 2009; Carneiro, 2014). Observations considered as outliers were excluded from the sample. This detection method of outliers was chosen because of its robustness, in view of the absence of influence from external value, as opposed to method that consider the standard deviation in the detection of atypical values for example.

4. Results and Analysis

4.1 Descriptive statistics of funds in the sample

After the restrictions established according to the method, the final sample of active Ibovespa funds consisted of 152 funds, with a mean age of 12 years and mean management fee of 0.16 % per month. On average, these funds manage a net worth of 61.41 million *reais*. The descriptive statistics of the funds in the sample are displayed in Table 1.

Table 1

Descriptive statistics of sample funds, monthly data from 01/2014 to 09/2015

Indicators		Active Ibov. Stock	
Number of Funds		152	
Management Fee		Age	
Maximum (in % p.m.)	0.53%	Maximum	36.19
Mean (in % p.m.)	0.16%	Mean	12.31
Minimum (in % p.m.)	0.00%	Minimum	0.76
Standard Deviation (in % p.m.)	0.11%	Standard Deviation	8.37
Net Equity in million BRL		Monthly Return (in %)	
Maximum	1373	Maximum (in % p.m.)	36.16%
Mean	61.41	Mean (in % p.m.)	-2.91%
Minimum	0.97	Minimum (in % p.m.)	-36.75%
Median	17.26	Median (in % p.m.)	-2.67%
		Standard Deviation (in % p.m.)	13.51%

Obs.: (in % p.m.) – percentage per month
 Source: Created by the authors based on the sample data

As regards the risk-adjusted performance before fees, on average, the funds' performance is negative, and the results calculated by the three proposed models presented similar results (Table 2).

Table 2

Descriptive statistics of Active Ibovespa fund performance (Jensen's alpha)

	Model					
	Carhart (1997)		Fama and French (1993)		Fama and French (2015)	
Minimum	-0.46300	Minimum	-0.45550	Minimum	-0.47080	
Mean	-0.02420	Mean	-0.02274	Mean	-0.02076	
Median	-0.01820	Median	-0.01854	Median	-0.01766	
Maximum	0.35830	Maximum	0.36390	Maximum	0.41840	
Standard Deviation	0.13375	Standard Deviation	0.13187	Standard Deviation	0.13414	

Source: Created by the authors based on the research data

As observed, the funds' performance is spread. To give an example, according to the model by Fama and French (2015), the Jensen's alpha coefficient of the funds ranged between – 0.47 and 0.42 p.m., with standard deviation of 13.41%. This variation may reflect the particular characteristics of each. This aspect will be analyzed further ahead when the results of the regressions are observed, controlled by the fund characteristics.

4.2. Analysis of performance determinants

The results of the model proposed in Equation 5 can be observed in Table 3. Using different correction procedures for self-correlation and heteroscedasticity, the results point towards a strongly negative relationship between management fee and performance – the latter being measured using Jensen’s alpha.

Table 3

Regression analysis (performance explained by management fee)

Risk-adjusted performance	Correction Method (Standard errors)	Coefficient	Adjusted R ²	F-test
Carhart	White	-15.457***	0.01702	31.26***
Carhart	Clustered ¹	-15.46**	0.01702	
Carhart	Fama-MacBeth	-14.572***	0.02064	
Fama and French (1993)	Clustered ¹	-15.675**	0.01805	33.13***
Fama and French (1993)	Fama-MacBeth	-15.069***	0.02302	
Fama and French (2015)	Clustered ¹	-14.314**	0.0145	26.71***
Fama and French (2015)	Fama-MacBeth	-13.406***	0.01898	

Obs.: ¹ Clustered per month and per fund, *, **, *** indicate statistical significant at 5%, 1% and 0.1%, respectively.

Source: research results

As with the results by Gil-Bazo and Ruiz-Verdú (2009) for the American market, there is also a negative relationship between the management fee and the risk-adjusted performance before fees in the Brazilian market. This is an indication that funds with high fees do not necessarily provide high returns to the investor and, thus, the differences in fees also reflect differences in the value the funds create for the investor.

In Brazil, Rochman and Ribeiro (2003) also observed a negative effect of the management fee on the Sharpe ratio of Brazilian open funds (a measure of performance that relates risk and return). According to these authors, this negative relation can signal the occurrence of information asymmetry. Thus, smaller investors who have less information (knowledge) about the industry as a whole end up investing in funds with low profitability and high management fees; on the other hand, more knowledgeable investors looking for funds with lower fees and higher returns.

Similarly, Gil-Bazo and Ruiz-Verdú (2008) consider that the revenues of a fund come from the fees and value of the funds’ equity. Thus, in a scenario where the quality of the fund is not observable (high quality funds being those capable of generating greater value for the investor), high-quality funds can be differentiated by the lower fees and are likely to dominate the market of sophisticated investors. Thus, poor-quality funds will focus on attracting investments from unsophisticated investors. Therefore, interaction is needed between asymmetric information and the presence of unsophisticated investors in the market.

In the Brazilian market, Paz et al. (2017) conclude, through the results of their studies, that institutional investors are able to obtain better investment conditions (lower management fees and better performance). This would be consistent with the positive relationship between increased investor monitoring capacity and fund performance (greater monitoring implies better performance).

A conclusion that resembles that of Rochman and Ribeiro (2003), Gil-Bazo and Ruiz-Verdú (2008) and Paz et al. (2017) comes from Vidal et al. (2015), in which they argue that this negative relationship may be a consequence of the funds that strategically establish the value of the fees based on their previous or expected performance. Thus, funds with low performance tend to raise fees because their investors are less sensitive to the performance of the funds. On the other hand, top performing funds maintain low fees to compete for performance-sensitive investors.

The results obtained using the model of Equation 6, in which, in addition to the effect of management fees, the effect of other variables on performance is explored, can be observed in Table 4. The main result is similar to that presented in Table 3 - a negative relationship between performance and management fee.

Table 4

Regression analysis (performance explained by management fee and control variables)

Performance measured using the Carhart model (1997)			
	Coefficient	Adjusted R ²	F-Test
Intercept	-0.1089**		
Management fee	-10.443***		
Age	-0.00184***		
NE	0.00742***		
Seal	0.03029	0.04916	7.017***
Performance measured using the Fama and French model (1993)			
	Coefficient	Adjusted R ²	F-Test
Intercept	-0.01006**		
Management fee	-10.605***		
Age	-0.001984***		
NE	0.006843***	0.04622	6.640***
Seal	0.02854		
Performance measured using the Fama and French model (2015)			
	Coefficient	Adjusted R ²	F-Test
Intercept	-0.0979**		
Management fee	-9.0575**		
Age	-0.0021***		
NE	0.0066***		
Seal	0.02526	0.04744	6.797***

Obs.: *, **, *** indicate statistical significance at 5%, 1% and 0.1%, respectively. In the regressions, dummies were added to control for the months. White's Correction for heteroscedasticity was used.

Source: research results

Based on the results, we can observe a negative relationship between the fund's management fee, as well as its age, and fund performance. This is in line with the results found by Milani and Ceretta (2013), although the authors emphasize that the influence of age depends on the category of funds analyzed. This brings evidence that funds that charge a higher management fee tend to deliver poorer performance.

The fund's net worth has a positive relation with its performance, in line with the findings of Milani and Ceretta (2013), Carneiro (2014), Milan and Eid Junior (2014) and Paz et al. (2017), although it differs from the results found by Chen et al. (2004). This result strengthens the idea that larger funds are capable of generating better risk-adjusted performance for their investors.

Milani and Ceretta (2013) argue that increases in the net worth of the funds may lower costs for the manager insofar as they provide economies of scale. Milan and Eid Junior (2014) also argue that, as the funds grow they gain negotiation power, which may facilitate the dilution of operating costs.

The coefficient of the variable Seal, although positive, was not statistically significant. Thus, there is no evidence to assert that funds with the Anbima seal of best practices perform better. This result corroborates the results of Paz et al. (2017).

It is inferred based on the study results that investors wishing to invest in active Ibovespa funds should pay attention to the management fee charged by this fund, its size (shareholders' equity) and its age, so as to try to infer which will provide the best performance. The difference in fees reflects a difference in the value the funds create for the investor.

5. Final Considerations

The objective of this study was to analyze the observed relationship between management fee and risk-adjusted performance before fees for the Brazilian equity investment funds market (active Ibovespa) from January 2009 to September 2015.

The risk-adjusted performance before fees was calculated for each fund in the sample by regressing the surplus return of the fund against the risk factors of the Carhart (1997), Fama and French (1993,2015) models. Subsequently, we estimated the risk-adjusted performance for each fund as the difference between the surplus return before interest rates and the risk premium realized, defined as the beta vector multiplied by the vector of the factors performed each month.

It was concluded that the management fee has a negative relation with the risk-adjusted performance of the Brazilian active Ibovespa funds before fees. Thus, funds with higher fees provide a worse performance for investors. Consequently, investors could associate lower management fees with better performance. It is observed that the results found for the Brazilian market corroborate the studies of other authors - Gil-Bazo and Ruiz-Verdú (2009), Mansor et al. (2015), Vidal et al. (2015). As Rochman and Ribeiro (2003) highlight, however, this negative relation can signal the occurrence of information asymmetry. Hence, the incorporation of some variable that can capture this asymmetry is suggested for future work.

In addition, it is also concluded that larger funds generate a better performance for the investor and that the fund's age negatively affects its performance. The variable seal, which served as a proxy to measure the compliance of the funds with the best practices of corporate governance did not present statistical significance, but the observation of the influence of the corporate governance level on the performance of the fund should be better explored and remains as a suggestion for future studies.

This research extends the results of the literature as follows: it shows that there is a negative relation between management fee and performance, even when controlling for variables such as size, age and quality in terms of corporate governance. In addition, this relationship exists independently of the model used to measure fund performance. In addition, it presents more current evidence and for an emerging market. Also, it provides evidence that there is no relationship between best corporate governance practices and the achievement of good performance.

In practical terms, this research shows that investors should pay attention to the value of the management fee when selecting an active fund to invest in, as this may erode the performance delivered to the shareholder. Similarly, managers need to pay attention to management practices in order to minimize the cost of management, so as to reduce management fees and deliver better performance.

These study results come with limitations, the type of fund chosen, by the models analyzed and by the temporal cut may have exerted influence. Another limitation is the fact that other costs associated with investment fund management could not be taken into account, such as the transaction costs and other variables that may be related with fund performance. Thus, for the sake of future studies, we suggest analyzing the influence of other variables on the performance and extending the study to other types of funds and/or methods (non-parametric regressions for example).

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